271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978
P 908.470.0470
F 908.470.0479
www.advancedburner.com

August 16, 2006

Mr. George W. Cross
President and Chief Operations Officer
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Subject: Intermountain Generating Station Unit 2 Low NO_x Burners

Ref: Response to IPSC Letter Dated July 31, 2006

Dear Mr. Cross:

Having reviewed the referenced letter it is clear that there are significant misunderstandings regarding our positions, design conditions, evaluations of the problems being reported and our actual experience. It is regrettable that you choose to claim that ABT has fallen "short of the claims, guarantees and warrantees" provided for in the contract. In truth, all of our claims have been and are correct and we have met or exceeded all performance guarantees expressed in the contract; in addition to our predictions. It now appears that, regardless of our previously supplied objective comments, which we do not consider differences of opinions or viewpoints, you have chosen to make a warrantee claim for damage that you have been led to believe is ABT's fault.

Regarding our claims: if IPSC personnel have not already done so, we suggest that they contact all of the references we have provided as part of the proposal phase. You will find that all of the claims we made were true at that time and since.

Regarding performance guarantees: You may be aware that our service manager, Tarkel Larson, was at the site to start up the boiler. Although we were ready at that time to commence optimization, the station was not. The reason we were given was that the test grid was not ready and we should leave and would be called back "soon". After nearly six weeks we called to enquire when we could return to perform the testing. At that time we were told that the station was attempting to tune our burners using new flame scanners and burner air flow measurements and those attempts were not successful. In fact we were told there must be something wrong with our burners since attempting to move the flame so as to see changes in the new scanners was proving unsuccessful. Had we been advised that this was the plant's intent, we would have advised against it. For the simple fact that we have gone to considerable extent to develop a low NO_x burner that produces a very stable flame, low NO_x, low CO and UBC and very good turndown. Once the grid was installed we demonstrated all guarantees in a matter of days. All retentions were then paid.

While it is not my intention to respond here to all the comments in your multi-page letter, I do have a few brief comments to make:

Overheating: The only concern that IPSC personnel ever expressed to ABT was overheating of the original B&W registers. IPSC insisted on substituting a high alloy steel, 253 MA, for the other carbon and stainless steels we normally use; despite our assurances that we have never experienced, with our registers, the high temperatures in the register locations that were of concern and that we saw no need to substitute exotic materials for our normal ones. Nevertheless, the plant chose to proceed with the 253 MA.

Subsequent to the startup at no time did the register temperatures exceed the normal values we have seen, thereby confirming our predictions.

However, as I noted in previous correspondence, at no time was ABT ever informed that high burner barrel temperatures had been experienced with the OEM burners and that the solution was adding an extension made of stainless steel; this is a completely different problem than the register temperature. Clearly ABT should have been advised of this history so that we could make our own design decisions as to how to deal with that problem (which we have never seen on any other B&W burners we have replaced; thereby indicating that there is something amiss at Delta). As you have noted it is not IPSC's responsibility to design our equipment; but as I have noted it is incumbent upon IPSC to provide us with any and all relevant information so that we can design to the proper conditions. Clearly, ABT was not provided all the relevant information.

Large Burner Throats: It seems clear that you have completely misunderstood my comments. No, we are not "just beginning to understand that burner fronts with large throats can cause overheating in the barrel." Quite the contrary: on installations of ours with large burner throats, none have ever experienced overheating problems on any part of the burner. We have installations on very hot pre-NSPS boilers with 52" throats that have been in service since the late 1990's with no such indications, let alone failures.

In fact there is a site that has our first installation in Vernal, Utah, Deseret's Bonanza #1, which has burners installed in 1997, has 54" throats and has had no problems of reliability. This unit typically operates at NO_x levels in the 0.35-0.4 range and is not equipped with overfire air. You should also note that when Deseret became aware that their operating conditions could change they asked us to do an evaluation of the new conditions and render an opinion (which we did at not cost to them) rather than make assumptions as to how our equipment would react under the new conditions. As a consequence, that plant has had no problems even though they have made major modifications to their operation.

To repeat: there is *no* ABT installation that suffers the problems that occur at Delta #2. Logic as well as common sense would dictate that the problem is not in the burner design but in the site-specific conditions that ABT was never notified about. The responsibility to provide the burner design conditions, and maintain them during operations, remains with the owner; in this case IPSC.

All of the above not withstanding, we have been very clear all along that we are willing to work with IPSC to address the situation as it now stands. I suggest that the only way this can be accomplished is by a direct meeting between you and me with no more than one or two of our respective staff members who are most familiar with this retrofit project.

If you are in agreement, please call me to finalize a meeting date (908-470-0720).

Sincerely,

Joel Vatsky, President

Cc: Sal Ferrara

JV-GC8-16-06.DOC

4/10/06 CD

MEMORANDUM

INTERMOUNTAIN POWER SERVICE CORPORATION

TO: George W. Cross

FROM: Dennis K. Killian

DATE: April 10, 2006

SUBJECT: Response to Condition of Unit 2 Burners

It is obvious after seeing the state of the Unit 2 burners that we need a plan for their future repair or replacement. Right now, we are documenting the damage to each of the burners with pictures and drawings to use in the design review process or for legal recourse reasons. We will also send out a burner tip for metallurgical and failure analysis.

The weaknesses of the ABT burners seem to be with erosion around the diffuser and at the tip and with structural failure (possibly thermal stresses) at the tip. What we are doing with the diffuser should solve the erosion in the burner barrel for now but, we still have doubts about the long term. The add-on falsies will buy us time with the tip erosion but, they do nothing to solve the inherent design flaw that allows such rapid erosion. We will replace nozzles too broken to install the falsies with straight nozzles similar to what is on Unit 1. We believe these repairs will allow us to operate safely for another two years.

We learned from the review of the B&W burners that even B&W did not respect the amount of radiant heat on burners that large. It took a finite element analysis from an outside consultant we hired for them to incorporate the necessary design changes in the second iteration of Unit 1 burners that have allowed them to operate this long. We may need to do the same thing with the ABT burners.

If nothing else, it might be possible to incorporate the strengths of both the B&W burners and the ABT burners in our own hybrid design. It appears possible to install the B&W conical diffuser, ceramic lined barrel, and stainless steel straight tip with the ABT registers. We would probably lose some of the NO_x reduction but, with the Unit 2 OFA we should still be able to meet the current WEPCO limits. They should work about the same as the current burners on Unit 1.

4/25/06 CD

INTERMOUNTAIN POWER SERVICE CORPORATION

April 24, 2006

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Request for Repair of Intermountain Generating Station Unit 2 Burners

In March 2004, we installed 48 of your Opti-Flow Low NO_X Burners in Unit 2 at the Intermountain Generating Station under Contract 45606. Since that time, we have experienced numerous problems with the burners. Among the most important identified to date are the following:

1. Erosion of the burner barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

2. Erosion of the burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

4. Erosion of the ceramic lined long-sweep elbow and X-vane diffuser.

5. One burner (F3), was completely replaced because it was damaged in a burner fire on June 25, 2005. After inspecting the damaged burner, we believe the fire was caused by a hole eroded in the burner barrel just after the elbow. We believe the hole allowed coal to enter the inner air sleeve and eventually catch on fire damaging the burner.

The contract you signed with us on September 12, 2003 contained several clauses pertaining to the failures that we have experienced. For example, Division F2, Article 5, Paragraph "g" states:

> *"Experience based and verified wear-life shall be quoted within the bid for all burner components. No component shall last less than four (4) years before requiring rebuild, restoration, or replacement."*

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8/1/06 CD

INTERMOUNTAIN POWER SERVICE CORPORATION

July 31, 2006

Joel Vatsky, CEO
Advanced Burner Technologies
271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978

Intermountain Generating Station Unit 2 Low NO_x Burners
Contract 04-45606; Response to ABT Letter dated May 9, 2006

Dear Mr. Vatsky:

We regret that the burners supplied by ABT fall short of the claims, guarantees, and warranties provided for in Contract 04-45606. The burner deficiencies have caused IPSC to incur considerable cost and inconvenience. We reiterate that we are holding ABT responsible for those costs allowed for in the subject contract. We request a favorable response to these claims by August 18, 2006. If we are not satisfied with your response, we will refer this claim to our attorneys.

While your May 9, 2006 letter very eloquently denied our claims, your responses did not address contractual guarantees made by ABT. In fact, there is clear evidence that ABT did not adequately design the burners as required by the contract specifications. It is not our intent to engage in a tit-for-tat debate over opinions and differences in viewpoint. Rather, we would like to refocus this issue on the contractual guarantees and the expectations we had of your burners that failed us. We illustrate just a few examples in the following paragraphs.

1. **Burner Design**
   You claimed in the subject letter that IPSC had not been forthcoming with you when you claimed, "*In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels.*" Under item 1 of said letter "*IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design.*" Let us address each of these items separately:

   Design Fuel
   IPSC has not changed its fuel. As stated in ABT's proposal under Executive Summary and Philosophy "*The specification* (Referring to Specifications 45606; Attachment 3; General Coal Properties) *lists several western bituminous coals, none of which, either singly or in the combinations specified, present any problem to ABT.*" This list has coals with High Heating Values (HHV) ranging from 11,292 Btu/lb to 13,069 Btu/lb. Intermountain's average HHV over the two years of operation (April 2004 to April 2006) was 11,481 Btu/lb. We recognize a four-month period during these two years when we received poor quality coal, but we compensated operationally by either running eight mills or reducing load such that the burners did not exceed the contract maximum-rated BTU throughput of 220 Mbtu/hr.

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11/2/05 CO

faxed 11/1/05 CO

INTERMOUNTAIN POWER SERVICE CORPORATION

November 1, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Invitation to Visit IGS to Inspect Failing Burners

Intermountain Generating Station Unit 2 will be off line this coming Saturday, November 5, 2005. We invite you or your representatives to visit the site to inspect some of the ABT burners in this unit. Mr. Sal Ferrara asked us to inform ABT when an opportunity like this arose. This is the second outage of this type in the past 30 days.

Several IPSC employees in the Engineering department have been in contact with Mr. Ferrara via telephone and e-mail to communicate premature erosion issues we are experiencing with the ABT burners that were installed on IGS Unit 2 in the spring of 2004. We have shared verbal descriptions, written inspection reports, and photographs of these issues with ABT in a good faith effort to get help resolving them. We feel strongly that it is important that your design Engineers visit the site and see for themselves the damage we see in these burners after just 18 months of operation.

We have expressed a desire to work with ABT to come up with a retrofit to these burners, and the fact that we are on a very tight schedule if the retrofit modifications are to be installed during our upcoming major outage on IGS Unit 2 in April of 2006. We need to act now if we are to have any chance of taking advantage of that outage window.

Please let us know in the next day or two if you plan to send someone. We will have knowledgeable personnel on call to host your visit when you arrive.

Please contact Mr. Dean Wood at (435) 864-6464 with questions regarding this request.

Sincerely,

George W. Cross

George W. Cross
President and Chief Operations Officer

DEW/JKH:jmj

850 West Brush Wellman Road, Delta, Utah 84624 / Telephone: (435) 864-4414 / FAX: (435) 864-6670 / Fed. I.D. #87-0388573

9/6/05 jmj

INTERMOUNTAIN POWER SERVICE CORPORATION

September 6, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Dissatisfaction with ABT Opti-Flow Burners in IGS Unit 2

This letter is to express the dissatisfaction of Intermountain Power Service Corporation with the performance of ABT's Opti-flow burners that were installed on Intermountain's Unit 2 in the spring of 2004. We are holding ABT at least partially culpable in the recent failure of the Unit 2 F3 burner module and request ABT's assistance in resolving our concerns.

The thermowell design supplied on your burner modules precludes the use of heavy-duty thermocouples (TC's). The bend radius is too tight to allow insertion of the 1/4 inch TC's we specified. The 1/16 inch TC's supplied with the burners are failing prematurely. We are convinced that lack of instrumentation, which would have warned us of a burner fire, contributed to the failure on F3.

We are also experiencing premature wear-related failure of some of our x-vane fuel distributors and elbows at the burner inlet. These failures are unacceptable, especially in burners that are only a little over a year old.

We have suspended plans to replace burners on Unit 1 until we can get these issues resolved. We are requesting assistance from ABT in investigating the cause of these failures and in making them right.

Please contact Mr. Dean Wood at (435) 864-6464 with questions regarding these claims or to set up a plant visit to resolve these issues.

Sincerely,

George W. Cross

George W. Cross
President and Chief Operations Officer

DEW/JKH:jmj

850 West Brush Wellman Road, Delta, Utah 84624 / Telephone: (435) 864-4414 / FAX: (435) 864-6670 / Fed. I.D. #87-0388573

9/6/05 jmj

INTERMOUNTAIN POWER SERVICE CORPORATION

September 6, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

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Sincerely,

George W. Cross

George W. Cross
President and Chief Operations Officer

DEW/JKH:jmj

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11/2/05 CO
faxed 11/1/05 CO

INTERMOUNTAIN POWER SERVICE CORPORATION

November 1, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

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We have expressed a desire to work with ABT to come up with a retrofit to these burners, and the fact that we are on a very tight schedule if the retrofit modifications are to be installed during our upcoming major outage on IGS Unit 2 in April of 2006. We need to act now if we are to have any chance of taking advantage of that outage window.

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Sincerely,

George W. Cross

George W. Cross
President and Chief Operations Officer

GWC:DEW/JKH:jmj

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8/1/06 CD

INTERMOUNTAIN POWER SERVICE CORPORATION

July 31, 2006

Joel Vatsky, CEO
Advanced Burner Technologies
271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978

Intermountain Generating Station Unit 2 Low NO_x Burners
Contract 04-45606: Response to ABT Letter dated May 9, 2006

Dear Mr. Vatsky:

We regret that the burners supplied by ABT fall short of the claims, guarantees, and warranties provided for in Contract 04-45606. The burner deficiencies have caused IPSC to incur considerable cost and inconvenience. We reiterate that we are holding ABT responsible for those costs allowed for in the subject contract. We request a favorable response to these claims by August 18, 2006. If we are not satisfied with your response, we will refer this claim to our attorneys.

While your May 9, 2006 letter very eloquently denied our claims, your responses did not address contractual guarantees made by ABT. In fact, there is clear evidence that ABT did not adequately design the burners as required by the contract specifications. It is not our intent to engage in a tit-for-tat debate over opinions and differences in viewpoint. Rather, we would like to refocus this issue on the contractual guarantees and the expectations we had of your burners that failed us. We illustrate just a few examples in the following paragraphs.

1. **Burner Design**
You claimed in the subject letter that IPSC had not been forthcoming with you when you claimed, "*In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels.*" Under item 1 of said letter "*IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design.*" Let us address each of these items separately:

Design Fuel
IPSC has not changed its fuel. As stated in ABT's proposal under Executive Summary and Philosophy "*The specification* (Referring to Specifications 45606; Attachment 3; General Coal Properties) *lists several western bituminous coals, none of which, either singly or in the combinations specified, present any problem to ABT.*" This list has coals with High Heating Values (HHV) ranging from 11,292 Btu/lb to 13,069 Btu/lb. Intermountain's average HHV over the two years of operation (April 2004 to April 2006) was 11,481 Btu/lb. We recognize a four-month period during these two years when we received poor quality coal, but we compensated operationally by either running eight mills or reducing load such that the burners did not exceed the contract maximum-rated BTU throughput of 220 Mbtu/hr.

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4/25/06 CO

INTERMOUNTAIN POWER SERVICE CORPORATION

April 24, 2006

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Request for Repair of Intermountain Generating Station Unit 2 Burners

In March 2004, we installed 48 of your Opti-Flow Low NO_x Burners in Unit 2 at the Intermountain Generating Station under Contract 45606. Since that time, we have experienced numerous problems with the burners. Among the most important identified to date are the following:

1. Erosion of the burner barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

2. Erosion of the burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

4. Erosion of the ceramic lined long-sweep elbow and X-vane diffuser.

5. One burner (F3), was completely replaced because it was damaged in a burner fire on June 25, 2005. After inspecting the damaged burner, we believe the fire was caused by a hole eroded in the burner barrel just after the elbow. We believe the hole allowed coal to enter the inner air sleeve and eventually catch on fire damaging the burner.

The contract you signed with us on September 12, 2003 contained several clauses pertaining to the failures that we have experienced. For example, Division F2, Article 5, Paragraph "g" states:

> *"Experience based and verified wear-life shall be quoted within the bid for all burner components. No component shall last less than four (4) years before requiring rebuild, restoration, or replacement."*

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271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978
P 908.470.0470
F 908.470.0479
www.advancedburner.com

ADVANCED BURNER TECHNOLOGIES

GWC

MAY 15 2006

May 9, 2006

Mr. George W. Cross, President and Chief Operating Officer
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Subject: Intermountain Generation Station Unit 2 Low NO_x Burners, Contract 04-45606
IPSC April 24, 2006 Letter

Dear Mr. Cross:

Advanced Burner Technologies Corporation (ABT) is concerned that damage has occurred to the burners we have supplied. Although we deny IPSC claims that ABT has any responsibility, we do however remain committed to help IPSC. To this end we have been working closely with the Plant to identify the root causes that first became evident on June 27, 2005 with IPSC's Mr. J. Finlinson's email notification of the F3 burner fire.

We can understand that changes in operation (such as fuel supply) and occasionally information that can be important to the supplier may, through inadvertent oversight, not be provided to the supplier. In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels. There is no way any equipment designer can design for conditions of which they are not made aware by the owner.

The following Items 1 through 5 of the subject Intermountain Power Service Corporation (IPSC) letter that describes problems identified by IPSC are as follows, with ABT responses added in **bold** text:

1. Erosion of the barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

   ABT response:
   The diffuser assembly, otherwise known as "x-vane", located in the elbow is a wear component, however it has worn more rapidly than the standard design we have in operation at all our other installations. ABT's proposal included supply of the standard x-vane design which eliminate the cleanout plug at the elbow's centerline; however, in early stages of the project IPSC requested a change in order to retain the existing port in the burner inlet elbow. ABT agreed to make the change but also advised IPSC that the standard x-vane as originally offered was a better, simpler, design. In any case, the accelerated wear to the x-vane assembly, and erosion of the barrel downstream of the long sweep elbow, is due to IPSC operation of their coal mills at higher flows than allowed by contract and the burner design. As stated in Proposal

Section 4.9, ...ABT will design the burners for the full load primary airflow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load. The design mill primary airflow (210,000 lb/hr) for fuel injector sizing was also confirmed early in the project with J. Vatsky 9/11/03 email correspondence to P. Hailes.

It did not become evident that IPSC is running the mills at much higher flows than design until October 2005. IPSC's G. Christensen 10/27/05 email correspondence advised flows are as high as 265,000 lb/hr, which is more than 25% greater than the burner design flow agreed between IPSC and ABT. ABT's S. Ferrara responded immediately with 10/28/06 email advising effects of higher operating flows by degrading performance and increasing component wear.

Based on IPSC long term records of fuels burned (Mr. G. Christensen 11/2/05 email correspondence) IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design. The lower than specified HHV (≤11,500 Btu/lb) results in overfiring of burners (higher than design air and coal flows) in order to maintain full load generation on the Unit.

2. Erosion of burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

ABT response:
Erosion of the burner nozzles is due to high velocities of the air/coal mixture in the nozzle, along with the higher coal loadings resulting from the lower heating value coal. This condition may be worse due to by denser coal streams being formed in the non-standard design of the x-vane assembly.

Had ABT known that IPSC intended to operate the mills at the current coal and air flows, the burner nozzles would have been designed accordingly resulting in lower nozzle velocities. ABT has not experienced nozzle erosion at any of its other installations where the mills are operating in the range for which the burner is designed.

In cases where it is known that erosive conditions exist (high velocity and/or highly abrasive fuel) ABT will apply erosion resistant materials in the fuel injector barrels as well as the inlet to the nozzles to maximize their longevity. This was not the case with IPSC as the coal was not considered to be highly abrasive and the contract defined flows result in relatively low air/coal velocity in the nozzle.

Had ABT been advised that such a fuel change and resultant mill operation was anticipated, we would have proposed the changes noted above.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

ABT response:
This is consistent with discussions held in the November 9, 2005 meeting at the Intermountain Generating Station where ABT explained that the carbon steel burner barrels were overheating upstream of the point where carbon steel barrel is welded to the stainless steel nozzle tip. The carbon steel is expanding at a higher rate than the

stainless casting causing the casting to rip at the weld and cracks to then form in the casting.

We advised in the meeting that the temporary repairs that IPSC wanted to implement would not resolve the barrel overheating and nozzle cracking problem. ABT explained that it would be necessary to extend the carbon/stainless steel weld point further from the furnace by replacing a section of the carbon steel barrel with a stainless steel barrel. IPSC advised in the meeting that the OEM burners originally provided on the Unit had experienced the same overheating problems witnessed on the ABT nozzles and the resolution was to extend the stainless steel portion of the barrel just as ABT is recommending. IPSC advised in the meeting that based on conditions observed during the recent October 2005 outage, it would not be necessary to implement ABT's recommendation to extend the carbon/stainless steel weld point back during the April 2006 outage.

Note that this was the first time ABT was advised of this overheating condition with the OEM burners and, had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel.

We have not experienced this type overheating problem on any of the ABT burner designs currently operating in the industry, which all have the carbon/stainless steel weld point in similar proximity to the furnace as is currently operating on the ABT burners at IPSC. The only time we have seen elevated temperatures on the carbon steel barrel is when the cooling secondary airflow to the burners was completely shutoff and we suspect that this may be happening at IPSC. We have suggested an investigative program to the Plant in order to determine if any operating conditions exist where insufficient cooling flow is available to the burners. In particular we believe that the compartmented windbox air control dampers may be too closed when the burner deck is out of service and have asked the Plant to investigate this. To date we have not had any response or been provided with any information.

4. Erosion of the ceramic lined long-sweep elbow and x-vane diffuser.

ABT response:
The ceramic lined long sweep elbows are original boiler equipment and were not replaced by ABT during the Low NOx Burner retrofit. The erosion of the x-vane diffuser is discussed in Item 1 above and is a result of IPSC operating the coal mills at primary air and coal flows much higher than allowed by the contract.

The x-vanes are replaceable components and are expected to wear over a period of years. ABT has an on-going development project to identify the latest wear-resistant materials so that we can select those materials that best fit the specific fuel properties and flow conditions for each project. At the design fuel and flow conditions specified by the IPSC project, the x-vane assemblies supplied by ABT would last many years prior to needing replacement. The fuel and flow conditions that IPSC has been recently operating at, and has defined for the future, would require a change to material selection of ABT's x-vanes, at an increased cost, in order to minimize the type wear IPSC is experiencing of this component. Further the burner barrels would have to be lined and the nozzles replaced with new ones designed for the actual flows now being utilized.

5. One burner (F3) was completely replaced because it was damaged in a burner fire on June 25, 2005. After inspecting the damaged burner, we believe the fire was caused by a hole eroded in the burner barrel just after the elbow. We believe the hole allowed coal to enter the inner air sleeve and eventually catch on fire damaging the burner.

   ABT response:
   Due to the extent of fire damage on F3 burner, it was not possible to determine the cause although based on the photos provided by IPSC it seems to have started either in the coal pipe or at the burner inlet. We noted that the coal pipe upstream of the burner, where the pipe passes through the floor grating, in the area of the coal pipe shutoff valve also showed evidence of fire, leading us to question whether the valve was only partly open.

   As noted in J. Finlinson's 6/27/05 email, the IPSC operators were starting up the other Unit on June 25, 2005 at the time the fire started on F3 burner and therefore did not notice the high temperature alarms(well over 1600°F). It is not known how long the fire went unnoticed by the operators, however operator action to take the burner out of service would have prevented permanent damage to the burner components. F3 burner is the only one of 48 burners on the unit that suffered permanent damage from fire in over 2 years of operation. This being the case, it can only be concluded that the F3 incident is due to some type of operational malfunction rather than due to design defect in the burner.

The subject April 24, 2006 letter notes that IPSC "purchased the materials necessary to temporarily repair the burners." IPSC's letter also states "we are now requesting the following remedial actions from ABT according to the contract:"

1. With no additional IPSC reimbursement, ABT should make the necessary modifications to their design to solve all the problems we have experienced with the burners as outlined in this letter and to otherwise meet all the specifications of the contract.

   ABT response:
   The ABT burners are designed to the conditions of the contract and the problems experienced are due solely to IPSC operating conditions being outside those specified. This type of operation has voided the ABT *"Guarantees and Warranties"* as stated in Proposal Q03013, Section 4.9 (Contract Article III: Part C). ABT has already made the necessary design modifications to meet the new operating conditions provided by IPSC and has provided the Plant with a proposal in November 2005.

2. With no additional IPSC reimbursement, ABT should supply the necessary materials and manpower to install those design changes on all 48 of the IGS Unit 2 burners. This work should be done on the next Unit 2 major outage scheduled for the Spring of 2008.

   ABT response:
   ABT has already proposed to supply replacement fuel injectors for all 48 of the IGS Unit 2 burners and, as noted above, has designed these to the new conditions provided by IPSC. IPSC shall install the ABT supplied materials at IPSC cost. ABT's offer made during the November 9, 2005 meeting remains to supply the new fuel injectors to IPSC at a discount. We offer the discount as a good will gesture to work with IPSC and resolve the unexpected problems amicably.

As a further good will gesture, ABT will maintain the November 2005 price if we receive the Purchase Order and initial payment by June 15, 2006 for delivery by December 2006.

3. ABT should reimburse IPSC for the burner purchased to replace the fire damaged F3 burner. We believe the fire was the direct result of an ABT design flaw that allowed rapid erosion of the burner barrel.

ABT response:
Damage to the F3 burner is due solely to operator inaction to control room alarms, allowing a burner fire to progress for long period rather than removing the burner from service to prevent permanent damage. The ABT design is not flawed and the rapid erosion problem is due to IPSC operating the burners at flow conditions outside the contract specifications.

4. ABT should reimburse IPSC for the materials purchased from ABT to repair the burners during the April 2006 Unit 2 outage.

ABT response:
During the November 9, 2005 meeting, ABT advised that the fuel injectors would require redesign to support operation at the higher flow rates. ABT also presented the new design arrangement during the meeting, and proposed to supply forty-eight fuel injectors for installation during the April 2006 outage. IPSC advised at that time that they were only interested in implementing temporary repairs during the April 2006 outage and intended to purchase the replacements designed for the new conditions for the next major outage. The cost for materials to make the temporary repairs will not be reimbursed by ABT to IPSC.

To summarize: the damage that has occurred is a direct result of changes in Plant operation (fuel and mill conditions) and failure of IPSC to inform ABT of the original burner barrel overheating problem that could have been addressed in the initial design phase.

AT remains committed to support IPSC in resolving these issues and hadprovided a proposal to do so as soon as we were advised of the actual operating conditions.

Please contact Sal Ferrara at 908-470-0721 to discuss any question you have on this matter.

Sincerely yours,

Joel Vatsky
President and CEO

Cc: Sal Ferrara

November 1, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Invitation to Visit IGS to Inspect Failing Burners

Intermountain Generating Station Unit 2 will be off line this coming Saturday, November 5, 2005. We invite you or your representatives to visit the site to inspect some of the ABT burners in this unit. Mr. Sal Ferrara asked us to inform ABT when an opportunity like this arose. This is the second outage of this type in the past 30 days.

Several IPSC employees in the Engineering department have been in contact with Mr. Ferrara via telephone and e-mail to communicate premature erosion issues we are experiencing with the ABT burners that were installed on IGS Unit 2 in the spring of 2004. We have shared verbal descriptions, written inspection reports, and photographs of these issues with ABT in a good faith effort to get help resolving them. We feel strongly that it is important that your design Engineers visit the site and see for themselves the damage we see in these burners after just 18 months of operation.

We have expressed a desire to work with ABT to come up with a retrofit to these burners, and the fact that we are on a very tight schedule if the retrofit modifications are to be installed during our upcoming major outage on IGS Unit 2 in April of 2006. We need to act now if we are to have any chance of taking advantage of that outage window.

Please let us know in the next day or two if you plan to send someone. We will have knowledgeable personnel on call to host your visit when you arrive.

Please contact Mr. Dean Wood at (435) 864-6464 with questions regarding this request.

Sincerely,

George W. Cross
President and Chief Operations Officer

DEW/JKH:jmj

9/6/05 jmj

INTERMOUNTAIN POWER SERVICE CORPORATION

September 6, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Dissatisfaction with ABT Opti-Flow Burners in IGS Unit 2

This letter is to express the dissatisfaction of Intermountain Power Service Corporation with the performance of ABT's Opti-flow burners that were installed on Intermountain's Unit 2 in the spring of 2004. We are holding ABT at least partially culpable in the recent failure of the Unit 2 F3 burner module and request ABT's assistance in resolving our concerns.

The thermowell design supplied on your burner modules precludes the use of heavy-duty thermocouples (TC's). The bend radius is too tight to allow insertion of the 1/4 inch TC's we specified. The 1/16 inch TC's supplied with the burners are failing prematurely. We are convinced that lack of instrumentation, which would have warned us of a burner fire, contributed to the failure on F3.

We are also experiencing premature wear-related failure of some of our x-vane fuel distributors and elbows at the burner inlet. These failures are unacceptable, especially in burners that are only a little over a year old.

We have suspended plans to replace burners on Unit 1 until we can get these issues resolved. We are requesting assistance from ABT in investigating the cause of these failures and in making them right.

Please contact Mr. Dean Wood at (435) 864-6464 with questions regarding these claims or to set up a plant visit to resolve these issues.

Sincerely,

George W. Cross

George W. Cross
President and Chief Operations Officer

DEW/JKH:jmj

850 West Brush Wellman Road, Delta, Utah 84624 / Telephone: (435) 864-4414 / FAX: (435) 864-6670 / Fed. I.D. #87-0388573

September 6, 2005

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

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Sincerely,

George W. Cross
President and Chief Operations Officer

DEW/JKH:jmj

ABT Burner Failure
Summary of IPSC Claims
October 11, 2006

Burners did not meet specifications nor live up ABT guarantees and claims as follows:

- *Nozzle Tip Failure:* IPSC experienced premature failure of burner nozzle tips (cracking and erosion)
- *Erosion:* Erosion is occurring rapidly and in areas other than in the elbow
- *Overheating:* Nozzles are warped and nozzle tips are sagging

IPSC asserts that:

- Fuel has been within design range with the exception of 4 months of poor-quality coal
- ABT used the wrong design basis for the burners
- ABT's claims that there are no environmental limitations on the burners is in errant
- ABT was aware of IPSC concerns about overheating of OEM burners
- IPSC has used out-of-service cooling air despite ABT claims that it is not needed

Design Fuel

- Design Fuel range 11,292 to 13,069 BTU/lb
- ABT stated any combination of fuel was OK
- Two-year average 11,481 BTU/lb as-burned
- Some low-spec coal was burned
- Reduced load or ran 8 Mills to compensate
- Did NOT exceed the Contract maximum-rated throughtput of 220 Mbtu-hr

Burner Design Basis

- ABT stated that the burner design point is 62 Mcfm PA flow @ 102 Mlb/hr coal flow
- Designed to the OEM mill curves; confirmed by Sal Ferrara
- ABT used the wrong steam flow basis for design (6,400,000 lb/hr)
- Design steam flow should have been 6,900,000 lb/hr
- This basis would yield 63.5 Mcfm at 110 Mlb/hr coal flow which correlates to 248,031 lb/hr PA flow (260,433 lb/hr if the allowed 5% is added)

Overheating

- ABT claimed "No environmental limitations"
- We have been concerned about overheat from Day 1
- We requested material upgrade to 253MA ($40,800 adder)
- We requested TC's even though ABT advised there was no need
- Unit 1 nozzles were upgraded from 25" 309 SS nozzles to 33" 253MA after 6 years
- ABT nozzles warped after 16 months
- IPSC maintained cooling air flow even though ABT advised none was needed
- SS to CS weld is within 1" of U1 design yet ABT nozzles warped

Out-of-Service Cooling Air

- ABT provided NO operating guidelines for out-of- service airflow

- ABT claimed cooling air is not needed
- We have always provided cooling air anyway (left at same damper positions as previous burners)

Erosion

- ABT claimed coal tips had an open design with no obstructions to wear or collect coal
- ABT claimed all wear would be limited to the wear-resistant devices in the elbow (X-vanes).
- IPSC is experiencing wear in various places and early in the life of the burners:
  - Wear through the elbows
  - Wear through the coal nozzle near the X-vane
  - Wear through the nozzle tips
- IPSC was told a CFD model of this design had been done. ABT later admitted no modeling was done.

Decide with Confidence

Business Information Report

Print this Report

Report Printed: APR 06 2006
In Date

BUSINESS SUMMARY

ADVANCED BURNER TECHNOLOGIES CORP
271 Rt 202-206 South
Pluckemin, NJ 07978

This is a **headquarters** location.
Branch(es) or division(s) exist.

Mailing address:	PO Box 410 Pluckemin, NJ 07978
Telephone:	908 470-0470
Chief executive:	JOEL VATSKY, PRESIDENT
Year started:	1996
Management control:	2001
Employs:	14 (10 here)
History:	CLEAR
Financing:	SECURED
SIC:	3433
Line of business:	Mfg.heating equipment specifically operating as a supplier of pulverized coal combustion equipment

D-U-N-S Number:	01-084-8534
D&B Rating:	**1R3**
Number of employees:	1R is **10 or more** employees.
Composite credit appraisal:	3 is **fair.**

D&B PAYDEX®:

12-Month D&B PAYDEX: 79
When weighted by dollar amount, payments to suppliers average 2 days beyond terms.

Based on trade collected over last 12 months.

SUMMARY ANALYSIS

D&B Rating: **1R3**
Number of employees: 1R indicates **10 or more** employees.
Composite credit appraisal: 3 is **fair.**

The 1R and 2R ratings categories reflect company size based on the total number of employees for the business. They are assigned to business files that do not contain a current financial statement. In 1R and 2R Ratings, the 2, 3, or 4 creditworthiness indicator is based on analysis by D&B of public filings, trade payments, business age and other important factors. 2 is the highest Composite Credit Appraisal a company not supplying D&B with current financial information can receive. For more information, see the D&B Rating Key.

Below is an overview of the company's rating history since 05/05/98:

D&B Rating	Date Applied
1R3	01/10/05
1R4	01/28/04
2R3	04/07/03
2R2	09/09/02
2R3	04/07/99
--	05/05/98

The Summary Analysis section reflects information in D&B's file as of April 3, 2006.

CUSTOMER SERVICE

Got a question about D&B Small Business Solutions? Need help using one of our small business services? No problem! Our dedicated team of friendly support technicians is only a mouse click or phone call away.

Click here to email us with your questions at sbsSupport@dnb.com.

If you'd like to speak with one of our member support technicians directly,call toll-free 1-866-472-7362, Monday thru Friday, 7:30 AM to 7:00 PM CST.

HISTORY

The following information was reported **11/29/2005**:

Officer(s): JOEL VATSKY, PRESIDENT

DIRECTOR(S): THE OFFICER(S)

Business started 1996 by the officers. 100% of capital stock is owned by JOEL VATSKY.

JOEL VATSKY born 1943. 1974-1997 employed by Foster Wheeler Corp, Clinton, NJ. 1997-present active here.

Business address has changed from 350 Main St, Bedminster, NJ, 07921 to 271 Rt 202/206s, Pluckemin, NJ, 07978.

CORPORATE FAMILY

Click below to buy a Business Information Report on that family member.

Branches (US):

Advanced Burner Technologies Corp	Bedminster, NJ	DUNS # 79-952-7812

BUSINESS REGISTRATION

CORPORATE AND BUSINESS REGISTRATIONS REPORTED BY THE SECRETARY OF STATE OR OTHER OFFICIAL SOURCE AS OF MAR 07 2003:

The following data is for informational purposes only and is not an official record. Certified copies may be obtained from the Pennsylvania Department of State.

Registered Name: ADVANCED BURNER TECHNOLOGIES CORP.

Business type:	CORPORATION
Corporation type:	PROFIT
Date incorporated:	JAN 07 1997
State of incorporation:	PENNSYLVANIA
Filing date:	JAN 07 1997
Registration ID:	2732425
Status:	INACTIVE
Where filed:	SECRETARY OF STATE/CORPORATIONS DIVISION, HARRISBURG, PA
Principals:	SHEKELL,LAWRENCE G, CHIEF EXECUTIVE OFFICER POLUTNIK,JOHN E, VICE PRESIDENT

OPERATIONS

11/29/2005

Description: Manufactures heating equipment, specifically operating as a supplier of pulverized coal combustion equipment (100%).

Website: www.advancedburner.com.

Has 10-20 account(s). Terms are on a contract basis. Sells to commercial concerns. Territory : International.

Employees: 14 which includes officer(s). 10 employed here.

Facilities: Leases 3,200 sq. ft. in on two floor of building.

Location: Central business section on side street.

Branches: Subject maintains a branch location Jacksonville, Florida & Chatanooga, Tennessee.

SIC & NAICS

SIC:
Based on information in our file, D&B has assigned this company an extended 8-digit SIC. D&B's use of 8-digit SICs enables us to be more specific to a company's operations than if we use the standard 4-digit code.

The 4-digit SIC numbers link to the description on the Occupational Safety & Health Administration (OSHA) Web site. Links open in a new browser window.

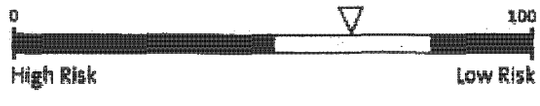
34330000 Heating equipment, except electric

NAICS:
333414 Heating Equipment Manufacturing, (except Electric and Warm Air Furnaces)

D&B PAYDEX

The D&B PAYDEX is a unique, dollar weighted indicator of payment performance based on up to 20 payment experiences as reported to D&B by trade references.

3-Month D&B PAYDEX: 67
When weighted by dollar amount, payments to suppliers average 18 days beyond terms.



12-Month D&B PAYDEX: 79
When weighted by dollar amount, payments to suppliers average 2 days beyond terms.

Based on trade collected over last 3 months.

Based on trade collected over last 12 months.

When dollar amounts are not considered, then approximately 95% of the company's payments are within terms.

PAYMENT SUMMARY

The Payment Summary section reflects payment information in D&B's file as of the date of this report.

Below is an overview of the company's dollar-weighted payments, segmented by its suppliers' primary industries:

	Total Rcv'd (#)	Total Dollar Amts ($)	Largest High Credit ($)	Within Terms (%)	Days Slow <31 (%)	31-60 (%)	61-90 (%)	90> (%)
Top industries:								
Nonclassified	6	1,750	500	100	-	-	-	-
Trucking non-local	4	5,350	2,500	77	23	-	-	-
Whol metal	3	35,000	20,000	71	29	-	-	-
Short-trm busn credit	2	7,550	7,500	100	-	-	-	-
Mfg process controls	1	200,000	200,000	100	-	-	-	-
Air courier service	1	750	750	100	-	-	-	-
Radiotelephone commun	1	500	500	100	-	-	-	-
Arrange cargo transpt	1	250	250	100	-	-	-	-
Telephone communictns	1	50	50	100	-	-	-	-
Other payment categories:								
Cash experiences	0	0	0					
Payment record unknown	0	0	0					
Unfavorable comments	0	0	0					
Placed for collections:								
With D&B	0	0						
Other	0	N/A						
Total in D&B's file	20	251,200	200,000					

The highest **Now Owes** on file is $15,000

The highest **Past Due** on file is $0

D&B receives over 600 million payment experiences each year. We enter these new andupdated experiences into D&B Reports as this information isreceived.

PAYMENT DETAILS

Detailed Payment History

Date Reported (mm/yy)	Paying Record	High Credit ($)	Now Owes ($)	Past Due ($)	Selling Terms	Last Sale Within (months)
03/06	Ppt	50	0	0		2-3 mos
	Ppt-Slow 30	2,500	0	0	N15	6-12 mos
02/06	Ppt	2,500	750	0		1 mo

	Ppt	500	0	0		2-3 mos
	Ppt	250	0	0		1 mo
	Ppt	250	0	0		4-5 mos
	Ppt	250	250	0		1 mo
	Ppt	250	250	0		1 mo
	Ppt	250	0	0		6-12 mos
	Ppt	100	0	0		6-12 mos
	Ppt	50	0	0		6-12 mos
01/06	Ppt-Slow 30	20,000	0	0	1/2 10 N30	2-3 mos
12/05	Ppt	750	750	0		1 mo
	Ppt	250	100	0		1 mo
	Ppt	0	0	0		2-3 mos
11/05	Ppt	15,000	15,000	0		1 mo
05/05	Ppt	250	0	0		6-12 mos
04/05	Ppt	7,500	500	0		
02/05	Ppt	500	0	0	N30	6-12 mos
12/04	Ppt	200,000	0	0		6-12 mos

Each experience shown is from a separate supplier. Updated trade experiences replace those previously reported.

FINANCE

03/16/2005

On March 16, 2005, attempts to contact the management of this business have been unsuccessful. Outside sources confirmed operation and location.

PUBLIC FILINGS

The following Public Filing data is for information purposes only and is not the official record. Certified copies can only be obtained from the official source.

UCC FILINGS

Collateral: All Assets
Type: Original
Sec. party: POLUTNIK, JOHN E., NORTH HUNTINGTON, PA
Debtor: ADVANCED BURNER TECHNOLOGIES CORP.
Filing number: 20904456
Filed with: SECRETARY OF STATE/UCC DIVISION, TRENTON, NJ

Date filed: 03/06/2002
Latest Info Received: 04/01/2002

Collateral: All Assets
Type: Original
Sec. party: SHEKELL, LAWRENCE G, CHAMPION, PA
Debtor: ADVANCED BURNER TECHNOLOGIES CORP
Filing number: 34930959
Filed with: SECRETARY OF STATE/UCC DIVISION, HARRISBURG, PA

Date filed: 02/15/2002
Latest Info Received: 03/11/2002

Collateral: All Assets

Type:	Original
Sec. party:	POLUTNIK, JOHN E, NORTH HUNTINGDON, PA
Debtor:	ADVANCED BURNER TECHNOLOGIES CORP
Filing number:	34930958
Filed with:	SECRETARY OF STATE/UCC DIVISION, HARRISBURG, PA
Date filed:	02/15/2002
Latest Info Received:	03/11/2002

Collateral:	Inventory including proceeds and products - Accounts receivable including proceeds and products - Account(s) including proceeds and products - Computer equipment including proceeds and products - and OTHERS
Type:	Original
Sec. party:	PNC BANK, NATIONAL ASSOCIATION, BLUE BELL, PA
Debtor:	ADVANCED BURNER TECHNOLOGIES CORP.
Filing number:	20911751
Filed with:	SECRETARY OF STATE/UCC DIVISION, TRENTON, NJ
Date filed:	03/07/2002
Latest Info Received:	04/01/2002

Collateral:	Inventory including proceeds and products - Accounts receivable including proceeds and products - Account(s) including proceeds and products - General intangibles(s) including proceeds and products - and OTHERS
Type:	Original
Sec. party:	PNC BANK NATIONAL ASSOCIATION, BLUE BELL, PA
Debtor:	ADVANCED BURNER TECHNOLOGIES CORP
Filing number:	34930960
Filed with:	SECRETARY OF STATE/UCC DIVISION, HARRISBURG, PA
Date filed:	02/15/2002
Latest Info Received:	03/11/2002

Collateral:	Accounts receivable including proceeds and products - Inventory including proceeds and products - Account(s) including proceeds and products - Computer equipment including proceeds and products - and OTHERS
Type:	Original
Sec. party:	PNC BANK, PHILADELPHIA, PA
Debtor:	ADVANCED BURNER TECHNOLOGIES, LLC
Filing number:	2069161
Filed with:	SECRETARY OF STATE/UCC DIVISION, TRENTON, NJ
Date filed:	10/05/2001
Latest Info Received:	11/05/2001

The public record items contained in this report may have been paid, terminated, vacated or released prior to the date this report was printed.

GOVERNMENT ACTIVITY

Activity summary

Borrower (Dir/Guar):	NO
Administrative debt:	NO
Contractor:	NO
Grantee:	NO
Party excluded from federal program(s):	NO

Possible candidate for socio-economic program consideration

Labor surplus area:	N/A
Small Business:	YES (2006)
8(A) firm:	N/A

The details provided in the Government Activity section are as reported to Dun & Bradstreet by the federal government and other sources.

Close | Print

271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978
P 908.470.0470
F 908.470.0479
www.advancedburner.com

ADVANCED BURNER TECHNOLOGIES

GWC

MAY 15 2006

May 9, 2006

Mr. George W. Cross, President and Chief Operating Officer
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Subject: Intermountain Generation Station Unit 2 Low NO_x Burners, Contract 04-45606
IPSC April 24, 2006 Letter

Dear Mr. Cross:

Advanced Burner Technologies Corporation (ABT) is concerned that damage has occurred to the burners we have supplied. Although we deny IPSC claims that ABT has any responsibility, we do however remain committed to help IPSC. To this end we have been working closely with the Plant to identify the root causes that first became evident on June 27, 2005 with IPSC's Mr. J. Finlinson's email notification of the F3 burner fire.

We can understand that changes in operation (such as fuel supply) and occasionally information that can be important to the supplier may, through inadvertent oversight, not be provided to the supplier. In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels. There is no way any equipment designer can design for conditions of which they are not made aware by the owner.

The following items 1 through 5 of the subject Intermountain Power Service Corporation (IPSC) letter that describes problems identified by IPSC are as follows, with ABT responses added in **bold** text:

1. Erosion of the barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

   ABT response:
   The diffuser assembly, otherwise known as "x-vane", located in the elbow is a wear component, however it has worn more rapidly than the standard design we have in operation at all our other installations. ABT's proposal included supply of the standard x-vane design which eliminate the cleanout plug at the elbow's centerline; however, in early stages of the project IPSC requested a change in order to retain the existing port in the burner inlet elbow. ABT agreed to make the change but also advised IPSC that the standard x-vane as originally offered was a better, simpler, design. In any case, the accelerated wear to the x-vane assembly, and erosion of the barrel downstream of the long sweep elbow, is due to IPSC operation of their coal mills at higher flows than allowed by contract and the burner design. As stated in Proposal

Section 4.9, ...ABT will design the burners for the full load primary airflow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load. The design mill primary airflow (210,000 lb/hr) for fuel injector sizing was also confirmed early in the project with J. Vatsky 9/11/03 email correspondence to P. Hailes.

It did not become evident that IPSC is running the mills at much higher flows than design until October 2005. IPSC's G. Christensen 10/27/05 email correspondence advised flows are as high as 265,000 lb/hr, which is more than 25% greater than the burner design flow agreed between IPSC and ABT. ABT's S. Ferrara responded immediately with 10/28/06 email advising effects of higher operating flows by degrading performance and increasing component wear.

Based on IPSC long term records of fuels burned (Mr. G. Christensen 11/2/05 email correspondence) IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design. The lower than specified HHV (≤11,500 Btu/lb) results in overfiring of burners (higher than design air and coal flows) in order to maintain full load generation on the Unit.

2. Erosion of burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

ABT response:
Erosion of the burner nozzles is due to high velocities of the air/coal mixture in the nozzle, along with the higher coal loadings resulting from the lower heating value coal. This condition may be worse due to by denser coal streams being formed in the non-standard design of the x-vane assembly.

Had ABT known that IPSC intended to operate the mills at the current coal and air flows, the burner nozzles would have been designed accordingly resulting in lower nozzle velocities. ABT has not experienced nozzle erosion at any of its other installations where the mills are operating in the range for which the burner is designed.

In cases where it is known that erosive conditions exist (high velocity and/or highly abrasive fuel) ABT will apply erosion resistant materials in the fuel injector barrels as well as the inlet to the nozzles to maximize their longevity. This was not the case with IPSC as the coal was not considered to be highly abrasive and the contract defined flows result in relatively low air/coal velocity in the nozzle.

Had ABT been advised that such a fuel change and resultant mill operation was anticipated, we would have proposed the changes noted above.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

ABT response:
This is consistent with discussions held in the November 9, 2005 meeting at the Intermountain Generating Station where ABT explained that the carbon steel burner barrels were overheating upstream of the point where carbon steel barrel is welded to the stainless steel nozzle tip. The carbon steel is expanding at a higher rate than the

stainless casting causing the casting to rip at the weld and cracks to then form in the casting.

We advised in the meeting that the temporary repairs that IPSC wanted to implement would not resolve the barrel overheating and nozzle cracking problem. ABT explained that it would be necessary to extend the carbon/stainless steel weld point further from the furnace by replacing a section of the carbon steel barrel with a stainless steel barrel. IPSC advised in the meeting that the OEM burners originally provided on the Unit had experienced the same overheating problems witnessed on the ABT nozzles and the resolution was to extend the stainless steel portion of the barrel just as ABT is recommending. IPSC advised in the meeting that based on conditions observed during the recent October 2005 outage, it would not be necessary to implement ABT's recommendation to extend the carbon/stainless steel weld point back during the April 2006 outage.

Note that this was the first time ABT was advised of this overheating condition with the OEM burners and, had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel.

We have not experienced this type overheating problem on any of the ABT burner designs currently operating in the industry, which all have the carbon/stainless steel weld point in similar proximity to the furnace as is currently operating on the ABT burners at IPSC. The only time we have seen elevated temperatures on the carbon steel barrel is when the cooling secondary airflow to the burners was completely shutoff and we suspect that this may be happening at IPSC. We have suggested an investigative program to the Plant in order to determine if any operating conditions exist where insufficient cooling flow is available to the burners. In particular we believe that the compartmented windbox air control dampers may be too closed when the burner deck is out of service and have asked the Plant to investigate this. To date we have not had any response or been provided with any information.

4. Erosion of the ceramic lined long-sweep elbow and x-vane diffuser.

ABT response:
The ceramic lined long sweep elbows are original boiler equipment and were not replaced by ABT during the Low NOx Burner retrofit. The erosion of the x-vane diffuser is discussed in item 1 above and is a result of IPSC operating the coal mills at primary air and coal flows much higher than allowed by the contract.

The x-vanes are replaceable components and are expected to wear over a period of years. ABT has an on-going development project to identify the latest wear-resistant materials so that we can select those materials that best fit the specific fuel properties and flow conditions for each project. At the design fuel and flow conditions specified by the IPSC project, the x-vane assemblies supplied by ABT would last many years prior to needing replacement. The fuel and flow conditions that IPSC has been recently operating at, and has defined for the future, would require a change to material selection of ABT's x-vanes, at an increased cost, in order to minimize the type wear IPSC is experiencing of this component. Further the burner barrels would have to be lined and the nozzles replaced with new ones designed for the actual flows now being utilized.

5. One burner (F3) was completely replaced because it was damaged in a burner fire on June 25, 2005. After inspecting the damaged burner, we believe the fire was caused by a hole eroded in the burner barrel just after the elbow. We believe the hole allowed coal to enter the inner air sleeve and eventually catch on fire damaging the burner.

   ABT response:
   Due to the extent of fire damage on F3 burner, it was not possible to determine the cause although based on the photos provided by IPSC it seems to have started either in the coal pipe or at the burner inlet. We noted that the coal pipe upstream of the burner, where the pipe passes through the floor grating, in the area of the coal pipe shutoff valve also showed evidence of fire, leading us to question whether the valve was only partly open.

   As noted in J. Finlinson's 6/27/05 email, the IPSC operators were starting up the other Unit on June 25, 2005 at the time the fire started on F3 burner and *therefore did not* notice the high temperature alarms(well over 1600°F). It is not known how long the fire went unnoticed by the operators, however operator action to take the burner out of service would have prevented permanent damage to the burner components. F3 burner is the only one of 48 burners on the unit that suffered permanent damage from fire in over 2 years of operation. This being the case, it can only be concluded that the F3 incident is due to some type of operational malfunction rather than due to design defect in the burner.

The subject April 24, 2006 letter notes that IPSC "purchased the materials necessary to temporarily repair the burners." IPSC's letter also states "we are now requesting the following remedial actions from ABT according to the contract:"

1. With no additional IPSC reimbursement, ABT should make the necessary modifications to their design to solve all the problems we have experienced with the burners as outlined in this letter and to otherwise meet all the specifications of the contract.

   ABT response:
   The ABT burners are designed to the conditions of the contract and the problems experienced are due solely to IPSC operating conditions being outside those specified. This type of operation has voided the ABT "Guarantees and Warranties" as stated in Proposal Q03013, Section 4.9 (Contract Article III: Part C). ABT has already made the necessary design modifications to meet the new operating conditions provided by IPSC and has provided the Plant with a proposal in November 2005.

2. With no additional IPSC reimbursement, ABT should supply the necessary materials and manpower to install those design changes on all 48 of the IGS Unit 2 burners. This work should be done on the next Unit 2 major outage scheduled for the Spring of 2008.

   ABT response:
   ABT has already proposed to supply replacement fuel injectors for all 48 of the IGS Unit 2 burners and, as noted above, has designed these to the new conditions provided by IPSC. IPSC shall install the ABT supplied materials at IPSC cost. ABT's offer made during the November 9, 2005 meeting remains to supply the new fuel injectors to IPSC at a discount. We offer the discount as a good will gesture to work with IPSC and resolve the unexpected problems amicably.

As a further good will gesture, ABT will maintain the November 2005 price if we receive the Purchase Order and initial payment by June 15, 2006 for delivery by December 2006.

3. ABT should reimburse IPSC for the burner purchased to replace the fire damaged F3 burner. We believe the fire was the direct result of an ABT design flaw that allowed rapid erosion of the burner barrel.

ABT response:
Damage to the F3 burner is due solely to operator inaction to control room alarms, allowing a burner fire to progress for long period rather than removing the burner from service to prevent permanent damage. The ABT design is not flawed and the rapid erosion problem is due to IPSC operating the burners at flow conditions outside the contract specifications.

4. ABT should reimburse IPSC for the materials purchased from ABT to repair the burners during the April 2006 Unit 2 outage.

ABT response:
During the November 9, 2005 meeting, ABT advised that the fuel injectors would require redesign to support operation at the higher flow rates. ABT also presented the new design arrangement during the meeting, and proposed to supply forty-eight fuel injectors for installation during the April 2006 outage. IPSC advised at that time that they were only interested in implementing temporary repairs during the April 2006 outage and intended to purchase the replacements designed for the new conditions for the next major outage. The cost for materials to make the temporary repairs will not be reimbursed by ABT to IPSC.

To summarize: the damage that has occurred is a direct result of changes in Plant operation (fuel and mill conditions) and failure of IPSC to inform ABT of the original burner barrel overheating problem that could have been addressed in the initial design phase.

AT remains committed to support IPSC in resolving these issues and hadprovided a proposal to do so as soon as we were advised of the actual operating conditions.

Please contact Sal Ferrara at 908-470-0721 to discuss any question you have on this matter.

Sincerely yours,

Joel Vatsky
President and CEO

Cc: Sal Ferrara

July 31, 2006

Joel Vatsky CEO
Advanced Burner Technologies
271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978

Intermountain Generating Station Unit 2 Low NOx Burners
Contract 04-45606; Response to ABT Letter dated May 9, 2006

Dear Mr. Vatsky:

We regret that the burners supplied by ABT fall short of the claims, guarantees, and warranties provided for in Contract 04-45606. The burner deficiencies have caused IPSC to incur considerable cost and inconvenience. We re-iterate that we are holding ABT responsible for those costs allowed for in the subject contract. We request a favorable response to these claims by August 18, 2006. If we are not satisfied with your response we will refer this claim to our attorneys.

While your May 9, 2006 letter very eloquently denied our claims, your responses did not address contractual guarantees made by ABT. In fact, there is clear evidence that ABT did not adequately design the burners as required by the contract specifications. It is not our intent to engage in a tit-for-tat debate over opinions and differences in viewpoint. Rather, we would like to refocus this issue on the contractual guarantees and the expectations we had of your burners that failed us. We illustrate just a few examples in the following paragraphs.

1. Burner Design

You claimed in the subject letter that IPSC had not been forthcoming with you when you claimed, "*In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels.*" Under item 1 of said letter "*IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design.*"
Let us address each of these items separately.

Design Fuel

IPSC has not changed its fuel. As stated in ABT's proposal under Executive Summary and Philosophy "*The specification* (Referring to Specifications 45606; Attachment 3; General Coal Properties*) lists several western bituminous coals, none of which, either singly or in the combinations specified, present any problem to ABT.*" This list has coals with High Heating Values (HHV) ranging from 11,292 Btu/lb to 13,069 Btu/lb. Intermountain's average HHV over the two years of operation (April 2004 to April 2006) was 11,481 Btu/lb. We recognize a four-month period during these two years when we received poor quality coal, but we compensated operationally by either running 8 mills or reducing load such that the burners did not exceed the contract maximum-rated BTU throughput of 220 Mbtu/hr.

Burner Design Basis (Fuel and Primary Air Flows)
In Section 4.9 of the Contract (ABT's proposal) you state that *"ABT will design the burners for full load primary air flow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load."* This should have been the design basis of your burners. Mr. Sal Ferrara confirmed that this was the basis you intended to use when he responded by e-mail to this specific question on 10/28/05, stating; *"the fuel injector was designed based on the OEM Mill "Present Curve" (see e-mail attachment) for full load, with one mill out of service. Based on the curve, the burner design point is 62 MCFM PA flow @ 102 Mlb/hr coal flow."*

Whereas your intent to use the OEM curves was clear, it appears you made an error in establishing your basis. The point stated by Mr. Ferrara comes from the OEM curves but at a steam flow of 6400 Mlb/hr (6,400,000 lb/hr) steam flow which is not the steam flow of the contract. As stated in the contract and in ABT's proposal introduction, the rated steam flow is 6,900 Mlb/hr (6,900,000 lb/hr).

Using the same OEM curve but extending it to 6900 Mlb/hr with 7 mills in-service, the primary air (PA) flow from the curve reads 63.5 MCFM at 110 Mlb/hr coal flow. This correlates to 248,031 lb/hr PA flow. Section 4.1 of your proposal allows for ± 5% tolerance in the PA flow. Therefore, the design should allow for PA flows up to 260,433 lb/hr with no damage to the burners or elbows.

You claim to have used a design point of 210,000lb/hr as the design flow for your fuel injector sizing and further claim that this point was confirmed by Mr. Phil Hailes of IPSC. Mr. Hailes' e-mail response to your question was specifically, *"3500 lbs/min is the average rate that Unit 1 at 950 MW is running at today with 7 mills. What specified condition are you requesting?"*. If you used this statement to determine you design point you did so in error. The number Mr. Hailes provided was an snap shot average of **Unit 1** and has no bearing on Unit 2. Your design point should have been based on the OEM curves as stated above.

2. Overheating

Again, in the subject letter, you accuse IPSC of not providing ABT with information concerning the overheating of the original equipment burner barrels. In item 3 it states, *"Note that this was the first time ABT was advised of this overheating condition with the OEM burners and had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel."*

Materials Selection
How can you make this assertion? It is ABT's responsibility to design for the environment that the burners will operate in. In ABT's contractual proposal, Section 6.4, Part C - Division C3 it states *"There are no environmental limitations to the coal burners."* Under the Explanatory Comment you further state, *"The reason for stating that there are no environmental limitations to the coal burners is that the stainless steel castings and plate facing the fire, ASTM 297 Gr He or 309 will not deteriorate at temperatures of at least 2000 °F... Consequently, ABT does not consider operation of its design in your boiler to have any environmental limitations. The conditions are such that no material will operate anywhere near its limit. In fact, ABT has placed no such limitation on any retrofit ABT has done."*

You must have been aware of IPSC's concern about high temperatures at the burner front since we paid an extra $40,800 for a material upgrade to 253MA on burner components due to heat concerns. We specified and paid for two (2) thermocouples to be installed on each burner for temperature monitoring even when you assured us none were needed.

The OEM burners in our Unit 1 were upgraded from a 25" long, 309 SS tip to a 33" long, higher grade cast tip to prevent thermal degradation of the nozzle tips. This was done only after 6 years of operation. For you nozzle tips to fail within 2 years of startup is unacceptable especially given

your contractual warrantee of 48 months for workmanship and quality of the coal nozzle tips (refer to Section 4.1 of ABT's proposal).

3. Coal-Nozzle Tip

In the subject letter, you state that, "We advised in the meeting that the temporary repairs that IPSC wanted to implement would not resolve the barrel overheating and nozzle cracking problem. ABT explained that it would be necessary to extend the carbon/stainless steel weld point further from the furnace by replacing a section of the carbon steel barrel with a stainless steel barrel."

Stainless-to-Carbon Steel weld location

A comparison of the distance from the centerline of the wall tubes to the tip-to-carbon steel transition between the ABT design and the upgraded OEM nozzles is within 1". You imply in your April 10, 2006 letter that you are just beginning to understand that burner fronts with large throats can cause overheating in the barrel. Please keep in mind that both our units have been running with the same coal and similar loads over the past two years. Unit 1 burners have not experienced the thermal damage witnessed in the ABT burners on Unit 2. In fact, Unit 1 has been running for 14 years with similar distance from water wall tube to the weld transition line without failure. Something in your design is not right.

Out-of-Service Cooling Air

Your subject letter (on page 3) implies that lack of cooling air flow on out of service burners could have lead to the damage witnessed in the coal-nozzle tips. If we did operate with no cooling air, you could hardly blame us since ABT did not provide us with operating guidelines for out of service flow? Out of service air flow is a system loss and was therefore one of the considerations for buying ABT burners since you claimed that cooling air was not needed. In reality, we have always used cooling air flow and the burners still failed.

Per your proposal, Section 3.6 ABT Field Services; ABT dispatched an engineer for field installation and testing support to assist during the initial stages of installation, startup, check-outs and during optimization of the new combustion equipment. At no time during this commissioning work was cooling-air flow an issue. The ABT personnel on the job stated that out-of-service cooling air was not required with the ABT design. This was consistent with ABT's claim in their proposal of no environmental limitations. On this advice IPSC left the out of service cooling air damper positions at the previous set points in the controls. Only in the April 10, 2006 ABT letter was cooling air on out of service burners a concern. Knowingly or unknowingly, ABT has misled IPSC on the ability of their burner to withstand the environment of operation.

4. Erosion

In Section 2.2 of your contractual proposal it states that; "*The segmented coal nozzle has an open design with no obstructions to wear or to collect coal*", and in 7.2; "*In the ABT design, all wear is limited to the wear-resistant devices in the elbow. The Opti-flow system eliminates coal ropes and produces a nearly uniform fuel/air mix with axial flow downstream of the elbow. Therefore, the only erosion-prone areas will be located within the elbow.*"

Clearly, we are experiencing erosion issues that neither IPSC nor ABT anticipated. We have addressed the question of excessive coal velocities in number 1 above. The fact that we have experienced erosion-related failures in our coal barrels, nozzle tips and sweep elbows in less than 2 years of operation is unacceptable especially in light of the assurances you gave us as referenced in the paragraph above and the warrantee of 48 months on the nozzle tips.

The erosion issue gets back to design. You assert that the only wear parts will be in the x-vane diffuser yet our burners are wearing through the sweep elbows, the coal barrel and at the coal-nozzle tip. Our notes from our meeting with you and Mr. Ferrara indicate that you admit that you did not conduct a CFD model of the sweep-elbow/x-vane diffuser combination. We maintain, based on experience, that there is a flaw in this design.

IPSC would like to remind ABT that the responsibilty to provide a burner design that will function properly in the operating environment of our furnaces lies with ABT not IPSC. Again, we request a favorable response to these claims by August 18, 2006.

Sincerely,

George W. Cross
President and Chief Operating Officer
Intermountain Power Service Corporation
:

July 20, 2006

Joel Vatsky CEO
Advanced Burner Technologies
271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978

Intermountain Generating Station Unit 2 Low NOx Burners
Contract 04-45606 ABT May 9, 2006 Letter

Dear Mr. Vatsky:

In response to ABT's May 9, 2006 response letter stating "*ABT is concerned that damage has occurred to the burners we have supplied" and stating "... we have been working closely with the Plant to identify the root causes..."*

IPSC has provided ABT with pictures and documentation concerning problems at Intermountain. ABT was invited by phone, email and then by an official letter to ABT inviting you to a sit visit to observe the damage during a known scheduled maintenance outage. ABT was not concerned enough to send someone to the plant site, Even during the 28 day planned outage April 2006, ABT personnel did not arrive until the 17th day of the outage to spend approximately 2 hours walking down the burners and taking pictures.

ABT's May 9, 2006 response letter also states "*In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels."* Under item 1 of said letter "*IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly HHV properties than allowed by ABT's design."*

IPSC response:

Fuel Changes

As stated in ABT's proposal under Executive Summary and Philosophy "*The specification* (Referring to Spec 45606 Attachment 3 General Coal Properties*) lists several western bituminous coals, none of which, either singly or in the combinations specified, present any problem to ABT."* This list has HHV ranges of 11,292 Btu/lb to 13,069 Btu/lb. The average HHV ov the two years of operation (April 2004 to April 2006) is 11,481 Btu/lb. Only 21% of the months (4 months) had coal with HHV less than 11,292 Btu/lb with 79% (19 months) greater than the 11,202 Btu/lb. Even at the lower HHV coal, the burners did not exceed the 115% of rated Btu output flow either by running with 8 mills in-service or due to lower load requirements.

PA Flows

Section 4.9 ... ABT will design the burners for full load primary air flow, per mill, as per the OEM mill curves. ABT's Sal Ferrara email response on 10/28/05 also stated "*the fuel injector was designed based on the OEM Mill "Present Curve" (see attachment) for full load, with one mill out of service. Based on the curve, the burner design point is 62 MCFM PA flow @ 102 Mlb/hr coal flow."*

This point stated by ABT comes from the OEM curve at 6400 Mlb/hr steam flow which is not the steam flow of the contract. As stated in the contract and ABT's proposal introduction, the rated steam flow is 6,900 Mlb/hr. Using the same OEM curve extending it to 6900 Mlb/hr, 7 mills in-service, the PA flow comes out 63.5 MCFM at 110 Mlb/hr coal flow. This correlates to 248,031 lb/hr PA flow. At +5% from 4.1 the value is 260,433 lb/hr. This flow was exceeded on the following pulverizers for the following months,

D Pulv: Apr 05, Jun 05, & Aug 05
E Pulv: Apr 05, Aug 05, Sep 05, & Oct 05
F Pulv: Apr 05
G Pulv: Apr 05 & May 05

The rest of the months on these pulverizers and the other four pulverizers over the total time did not exceed this +5% value. It should be noted that all burner rows had erosion issues.

As stated in the email concerning the primary air flow with Phil Hailes of IPSC, Mr. Hailes stated what PA flow the other unit was running at the time. There was no confirmation that the value given was a design point. No coal flow or heating value was asked for or given. The design of the barrels was from the OEM curve as stated in the May 9, 2006 letter and confirmed by S. Ferrara email. It is unfortunate that the wrong value was read from the curve by ABT.

As stated in 2.2. *"The segmented coal nozzle has an open design with no obstructions to wear or to collect coal "* and in 7.2 *"In the ABT design, all wear is limited to the wear-resistant devices in the elbow. The Opti-flow system eliminates coal ropes and produces a nearly uniform fuel/air mix with axial flow downstream of the elbow. Therefore, the only erosion-prone areas will be located within the elbow."*

Therefore, any PA flow higher than design would only increase wear in the wear resistant devices in the elbow as stated by ABT.

Overheating Issue

ABT's May 2006 response letter accuses IPSC of not providing ABT information concerning the overheating of the original equipment burner barrels. In item 3 it states *"Note that this was the first time ABT was advised of this overheating condition with the OEM burners and had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel."*

In ABT proposal 6.4 Part C - Division C3 it states *"There are no environmental limitations to the coal burners."* Under the Explanatory Comment it states *"The reason for stating that there are no environmental limitations to the coal burners is that the stainless steel castings and plate facing the fire, ASTM 297 Gr He or 309 will not deteriorate at temperatures of at least 2000 °F... Consequently, ABT does not consider operation of its design in your boiler to have any environmental limitations. The conditions are such that no material will operate anywhere near its limit. In fact, ABT has placed no such limitation on any retrofit ABT has done."*

IPSC paid an extra $40,800 for a material upgrade to 253MA on burner components due to heat issues. Two thermocouples installed on each burner for temperature monitoring were paid for. Cooling air flow on out of service burners is a loss and one of the selling points for buying ABT burners was their claim that cooling air was not needed.

Per proposal 3.6 ABT Field Services, ABT dispatched an engineer for field installation and testing support to assist during the initial stages of installation, startup, check-outs and during optimization of the new combustion sytem. At no time was cooling air flow an issue. The ABT personnel even stated that out of service cooling air was not required with the ABT design. IPSC left the out of service cooling air damper positions at the previous set points in the controls. Only in the April 10, 2006 ABT letter was cooling air on out of service burners a concern. This was consistent with ABT's claim in their proposal of no environmental limit.

In the April 10, 2006 ABT letter it states *"ABT believes that insufficient secondary air flow when the burners are out of service is the cause of this damage."* This confirms that knowingly or unknowingly, ABT has misled IPSC on the ability of their burner to withstand the elements of operation.

The April 10, 2006 ABT letter also states "*The fact that IPSC resolved the barrel overheating problem by replacing a section of carbon steel barrel with stainless steel in the section that ABT measured with high temperatures when the air flow is insufficient, confirms our analysis.*"

IPSC upgraded from a 25" 309 SS tip to a 33" higher grade cast tip after 6 years of operation and not 2 years. A comparison of the distance from the centerline of the wall tubes to the tip to carbon steel transition between the ABT design and the upgraded nozzles is under 1" .

Both units have been running with the same quality of coal and similar loads over the past two years. Unit 1 burners have not experienced the destruction seen by the Unit 2 burners. In fact, Unit 1 has been running for 14 years with similar distance from water wall tube to transition without failure.

IPSC requests that ABT take responsibility for the destruction of their burners and malfunction of the design of their burner and provide a resolution, supply the material and manpower to install those design changes and reimburse IPSC for the necessary modifications purchased from ABT to repair the burners during our April 2006 outage. Please respond by August 7, 2006 or will be forced to take legal action.

Sincerely,

George W. Cross
President and Chief Operating Officer
Intermountain Power Service Corporation
:

April 24, 2006

Mr. Joel Vatsky
Advanced Burner Technologies
P.O. Box 410
271 Route 202/206
Pluckemin, NJ 07978

Dear Mr. Vatsky:

Request for Repair of Intermountain Generating Station Unit 2 Burners

In March 2004, we installed 48 of your Opti-Flow Low NO_X Burners in Unit 2 at the Intermountain Generating Station under Contract 45606. Since that time, we have experienced numerous problems with the burners. Among the most important identified to date are the following:

1. Erosion of the burner barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

2. Erosion of the burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

4. Erosion of the ceramic lined long-sweep elbow and X-vane diffuser.

5. One burner (F3), was completely replaced because it was damaged in a burner fire on June 25, 2005. After inspecting the damaged burner, we believe the fire was caused by a hole eroded in the burner barrel just after the elbow. We believe the hole allowed coal to enter the inner air sleeve and eventually catch on fire damaging the burner.

The contract you signed with us on September 12, 2003 contained several clauses pertaining to the failures that we have experienced. For example, Division F2, Article 5, Paragraph "g" states:

> *"Experience based and verified wear-life shall be quoted within the bid for all burner components. No component shall last less than four (4) years before requiring rebuild, restoration, or replacement."*

Also, Division F2, Article 5, Paragraph "f" states:

> *"The burner assemblies shall be fabricated of quality material sufficient to withstand the significant thermal stresses occurring within the windbox as a result of both radiant and convective heating. Any deformation causing malfunction of register assemblies or misdirection of flow through the burner within the period of guaranteed operability shall be repaired at the earliest possible opportunity and charged to Contractor."*

Due to the need for continued operation of IGS Unit 2, we have purchased the materials necessary to temporarily repair the burners. However; we are now requesting the following remedial actions from ABT according to the terms of the contract:

1. With no additional IPSC reimbursement, ABT should make the necessary modifications to their design to solve all of the problems we have experienced with the burners as outlined in this letter and to otherwise meet all of the specifications of the contract.

2. With no additional IPSC reimbursement, ABT should supply the necessary materials and manpower to install those design changes on all 48 of the IGS Unit 2 burners. This work should be done on the next Unit 2 major outage scheduled for the spring of 2008.

3. ABT should reimburse IPSC for the burner purchased to replace the fire-damaged F3 burner. We believe the fire was the direct result of an ABT design flaw that allowed rapid erosion of the burner barrel.

4. ABT should reimburse IPSC for the materials purchased from ABT to repair the burners during our April 2006 Unit 2 outage.

If you have any questions concerning this matter, please contact Jerry Hintze at (435) 864-6460.

Sincerely,

George W. Cross
President and Chief Operations Officer

JKH:jmj

cc: Garry Christensen
Phil Hailes
Will Lovell
Mike Alley
Robert Rees
Nancy Bennett

4.0 Guarantees and Warranties

4.1 Workmanship and Quality:

ABT shall warrant the workmanship and quality of the supplied parts from the start-up date for a period of 12 months and 48 months for coal nozzle tips. ABT will supply a replacement for any supplied part which suffers a catastrophic failure due to design or workmanship flaws. IPSC will provide complete access to any supplied part that fails, including removal of any equipment that prevents access to the part to be replaced or repaired and removal and reinstallation of any complete ABT-supplied assemblies that cannot be repaired in-situ.

Changes to the appearance and dimensions of any part will be considered failures only if guaranteed emissions are affected to the extent that the unit is out of compliance and readjustment of burner operating parameters fails to return the emission to within guarantee level; and there are no changes to other equipment, operating methods, or fuel supply which could result in changes to the emissions.

The following requirements apply to both the material warranty and the below listed guarantees:

- Primary air flows shall be within ± 5% of the mill manufacturer's design primary air flow vs. coal flow curve
- Mills will not be operated at full load with more than one burner out of service.

4.2 Reliability

The Opti-Flow™ fuel injector components will prevent coal layout and dropout as well as the potential resultant coking inside the fuel injector during normal start-up and operation. Failures caused by other equipment are excluded, for example: mill and control system problems, igniters, or failed/stuck burner shut-off valves.

4.3 Pressure Drop

4.3.1 Fuel Injector

The pressure drop across the new fuel injector, as measured between the inlet flange and the furnace, at the respective elevation, will be no greater than with the existing burner. The new fuel injectors will not limit boiler load.

4.3.2 Secondary Air

Windbox pressure will not exceed 2" W.C., with overfire air ports (to be supplied by others) open

Note: ABT will supply appropriate secondary air duct and windbox turning vanes and baffles to minimize secondary air mal-distributions to the windboxes and instabilities within each windbox.

4.4 NO_x

ABT guarantees that NO_x will not exceed 0.33 b/10^6 Btu, with overfire air ports closed, at the design excess air of Section 4.6 and 100% MCR.

ABT predicts that NO_x with OFA ports open, with a flow of 20% of the total combustion air, will be less than 0.25 lb/MBtu.

NO_x is a function of several fuel variables, primary among them is fixed carbon to volatile matter (FC/VM) ratio and % fuel-bound nitrogen. Figure 4.1 represents the change in NOx guarantee parametrically in FC/VM against fuel nitrogen content as lb. $N_2/10^6$ Btu.

Note: The guarantee point represents the fuel properties specified in Section 4.9: 1.2% N_2 and 11.500 Btu/lb corresponds to 1.04 lb $N_2/10^6$Btu.

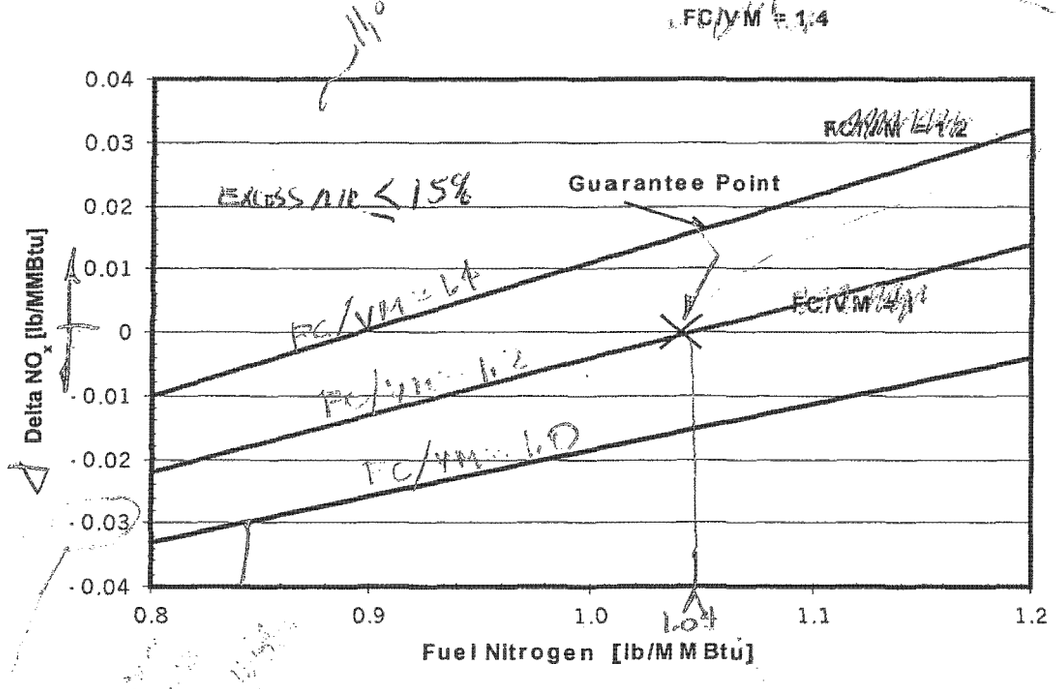


Figure 4.1 Change in NOx vs. Fuel Properties

Short-term periodic exceedances will be permitted provided the NO_x level returns below the guaranteed level after the unit stabilizes. This is necessary to accommodate potential NO_x variations during rapid load changes and while mills are coming in and out of service.

NO_x performance testing should be performed with both the CEMs and the economizer exit grid in operation. If the low NO_x system fails as indicated by CEMs but is within guarantee by the economizer exit test instruments, the latter shall govern and the CEMs shall be recalibrated against the test instruments.

4.5 CO

CO will not exceed an average of 200 ppm, with overfire air ports closed, at the boiler excess air as specified in Section 4.6 over boiler steam temperature control range, provided the fuel/mill conditions of Section 4.9 are met and that secondary air flows in each duct are steady and approximately equal (flow variations caused by plugged or unbalanced air pre-heaters are to be minimized).

4.6 Excess Air

The full load boiler excess air level at the burners will not exceed 15%. ABT will have the option of recommending a minimum O_2, across the respective boilers' steam temperature control range, at which NO_x, CO and LOI guarantees are simultaneously achieved, without deteriorating boiler performance.

4.7 Unburned Carbon Expressed as Loss On Ignition

LOI will not exceed the values obtained in pre-outage baseline testing; with overfire air ports closed with no more than 5% leakage/cooling air flow. This LOI level is guaranteed provided the conditions of Sections 4.6 and 4.9 are met; and the post retrofit LOI is sampled and measured using the same methods as in the pre-retrofit testing.

4.8 Boiler Performance

Boiler performance will not be deteriorated from the performance obtained during the baseline tests. Commercially acceptable variations in individual measured data will be acceptable (i.e., super heat temperature $\pm 10^{\circ}$ F, etc.).
Boiler efficiency will not be lower than the baseline measurements, corrected for excess air and fuel conditions.

4.9 Mill and Fuel Conditions

The above guarantees are predicated on the following:

- **Mill Performance:**
  Air Flow: The low NO_x burners will be designed to slave to the mills' operation in that the fuel injector will be sized to follow the mills' primary air flow characteristic. Consequently, ABT will design the burners for the full load primary air flow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load. Primary air flow must reduce as mill load decreases. PA flow will be determined during pre-retrofit testing defined in this proposal Section 2.4.

  Coal/PA Flow Balance: The balance between coal pipes within a given mill is to be within ±10% of the mean for that mill. (ABT recognizes that this is difficult to accomplish on all mills. Consequently, we will accept one of the eight mills being outside this range, to maximum of ±15%).

- **Fineness:** 99.5% < 50 Mesh and 70% < 200 mesh; all mills simultaneously.

- **Coal Properties:** Western U.S. bituminous:
  HHV > 11,500 Btu/lb; $N_2 \leq 1.2\%$; FC/VM ≤ 1.2; Ash ≤ 12%

4.10 Burner Load Variation

The nominal burner heat input at boiler full load with one mill out of service, is approximately 192 Mbtu/hr.

The ABT low NO_x burner's flame will remain stable at a load greater than 220 MBtu/hr, and less than 95 MBtu/hr.

Maximum secondary air flow at 220 MBtu per hour and 15% excess air, with 10% OFA flow will be no less than 124, 240 lb/hr.

Minimum secondary air flow will be determined by balancing the burner stoichiometry against the overfire airflow necessary to maintain minimum NO_x. Note that 45% load is below the steam temperatures control range listed on the B&W summary performance sheet.

4.11 Ash Patterns

The low NO_x system shall not increase or adversely alter the pattern of ash deposits on the furnace walls or high temperature superheater tubing such that existing soot blowing and/or steam de-superheating sprays cannot maintain tube cleanliness or steam temperatures. Furthermore, the burners shall not cause increased buildup of slag deposits around the burner openings (i.e., eyebrows).

4.12 Remedies for NO_x , CO and LOI Exceeding the Guarantee Values

ABT is offering a low NO_x combustion system consisting of state-of-the-art low NO_x burners. Since there are no technical combustion remedies currently available to correct a failure to meet specific combustion guarantees (if there were ABT would have included them within the original design) specific remedies are proposed.

Although we expect to meet the offered guarantees, we are proposing the following remedies in the event that NO_x/LOI/CO levels are not attainable.

4.12.1 Financial Remedies

a) NO_x Remedy

In the event that the NO_x guarantee is exceeded during the performance test and there are no combinations of burner adjustments that reduce the NO_x level to within the guarantee value, ABT will be permitted to adjust excess O_2 to reduce the NOx level to within the guarantee level, provided the requirements of Sections 4.8 and 4.10 are simultaneously met (i.e., no deterioration of boiler performance or ash patterns).

Liquidated Damage for NO_x: In the event the NO_x guarantee is not attainable ABT shall pay a liquidated damage of $50,000 per 0.01lb$NO_x$/$10^6$ Btu

b) LOI Remedy

In the event that the UBC guarantee is exceeded during the performance test, ABT will be permitted to readjust the firing system to reduce UBC to within guarantee levels. If there are no operational remedies and the criterion for the mills' fineness, performance, and coal are being met, ABT will pay a liquidated damage of $25,000/ 0.1% UBC in the fly ash.

c) CO Remedy

In the event that the CO guarantee is exceeded during the performance test, or as a result of the NO_x remedies of 4.9.1, ABT will pay a liquidated damage according to the following formula:

CO L.D. ($) =100 [Meas. CO – Guar CO] , where CO is in ppm corrected to 3% O_2.

4.13 Vendor Equipment

ABT will pass-through to IPSC the guarantees and warrantees for vendor-supplied equipment the Vendors offer to ABT.

Jul-03 coal sampled May 2003

Weighted Totals

Mine	sampled Total Tonnage	% of Total	% Na2O	HGI	Softening Temp	HHVC Btu/lb	% H20	% Ash	% Volatile	% Fixed Carbon	% Sulfur
Genwall Resources	27,501.08	5.81	2.04	45.5	2,148	12,426	6.95	8.51	39.04	45.50	0.67
Skyline (Product B) trucks	0.00	0.00	0.97	43.7	2,137	12,562	5.51	6.51	43.20	44.78	0.40
SUFCO (Product A)	195,613.19	41.35	2.96	42.4	2,122	11,292	8.37	11.06	37.57	43.00	0.39
Andalex	64,932.12	13.73	1.12	42.1	2,237	12,084	5.65	10.07	37.27	47.01	0.60
Andalex AMQ	0.00	0.00	0.84	39.1	2,277	11,981	6.64	9.44	34.78	49.14	0.56
West Ridge Resources	47,378.20	10.01	1.16	46.4	2,200	12,848	5.75	7.46	37.06	49.73	1.13
West Ridge Resources spc	27,929.48	5.90	0.94	45.9	2,234	13,069	5.22	7.07	37.53	50.18	1.18
Coastal-Dugout	26,777.20	5.66	0.48	40.4	2,357	11,977	5.80	11.45	35.72	47.03	0.68
Arch-Dugout (product B)	82,943.41	17.53	1.37	41.7	2,217	11,826	6.49	10.82	36.38	46.31	0.56
Arch (spot)	0.00	0.00	0.49	39.3	2,299	11,959	6.22	10.96	33.66	49.16	0.71
Totals	473,074.68	100.00	1.94	42.91	2,184	11,860	6.99	10.16	37.25	45.60	0.60

INTERMOUNTAIN POWER SERVICE CORPORATION

July 31, 2006

Joel Vatsky, CEO
Advanced Burner Technologies
271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978

Intermountain Generating Station Unit 2 Low NO_x Burners
Contract 04-45606; Response to ABT Letter dated May 9, 2006

Dear Mr. Vatsky:

We regret that the burners supplied by ABT fall short of the claims, guarantees, and warranties provided for in Contract 04-45606. The burner deficiencies have caused IPSC to incur considerable cost and inconvenience. We reiterate that we are holding ABT responsible for those costs allowed for in the subject contract. We request a favorable response to these claims by August 18, 2006. If we are not satisfied with your response, we will refer this claim to our attorneys.

While your May 9, 2006 letter very eloquently denied our claims, your responses did not address contractual guarantees made by ABT. In fact, there is clear evidence that ABT did not adequately design the burners as required by the contract specifications. It is not our intent to engage in a tit-for-tat debate over opinions and differences in viewpoint. Rather, we would like to refocus this issue on the contractual guarantees and the expectations we had of your burners that failed us. We illustrate just a few examples in the following paragraphs.

1. **Burner Design**
You claimed in the subject letter that IPSC had not been forthcoming with you when you claimed, "*In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels.*" Under item 1 of said letter "*IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design.*" Let us address each of these items separately:

Design Fuel
IPSC has not changed its fuel. As stated in ABT's proposal under Executive Summary and Philosophy "*The specification* (Referring to Specifications 45606; Attachment 3; General Coal Properties*) lists several western bituminous coals, none of which, either singly or in the combinations specified, present any problem to ABT.*" This list has coals with High Heating Values (HHV) ranging from 11,292 Btu/lb to 13,069 Btu/lb. Intermountain's average HHV over the two years of operation (April 2004 to April 2006) was 11,481 Btu/lb. We recognize a four-month period during these two years when we received poor quality coal, but we compensated operationally by either running eight mills or reducing load such that the burners did not exceed the contract maximum-rated BTU throughput of 220 Mbtu/hr.

850 West Brush Wellman Road, Delta, Utah 84624 / Telephone: (435) 864-4414 / FAX: (435) 864-6670 / Fed. I.D. #87-0388573

Burner Design Basis (Fuel and Primary Air Flows)
In Section 4.9 of the Contract (ABT's proposal) you state that *"ABT will design the burners for full load primary air flow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load."* This should have been the design basis of your burners. Mr. Sal Ferrara confirmed that this was the basis you intended to use when he responded by e-mail to this specific question on 10/28/05, stating; "*the fuel injector was designed based on the OEM Mill "Present Curve" (see e-mail attachment) for full load, with one mill out of service. Based on the curve, the burner design point is 62 MCFM PA flow @ 102 Mlb/hr coal flow.*"

Whereas your intent to use the OEM curves was clear, it appears you made an error in establishing your basis. The point stated by Mr. Ferrara comes from the OEM curves but at a steam flow of 6,400 Mlb/hr (6,400,000 lb/hr) steam flow which is not the steam flow of the contract. As stated in the contract and in ABT's proposal introduction, the rated steam flow is 6,900 Mlb/hr (6,900,000 lb/hr).

Using the same OEM curve but extending it to 6,900 Mlb/hr with seven mills in-service, the primary air (PA) flow from the curve reads 63.5 MCFM at 110 Mlb/hr coal flow. This correlates to 248,031 lb/hr PA flow. Section 4.1 of your proposal allows for ± 5 percent tolerance in the PA flow. Therefore, the design should allow for PA flows up to 260,433 lb/hr with no damage to the burners or elbows.

You claim to have used a design point of 210,000lb/hr as the design flow for your fuel injector sizing and further claim that this point was confirmed by Mr. Phil Hailes of IPSC. Mr. Hailes' e-mail response to your question was specifically, *"3,500 lbs/min is the average rate that Unit 1 at 950 MW is running at today with seven mills. What specified condition are you requesting?"*. If you used this statement to determine your design point you did so in error. The number Mr. Hailes provided was a snapshot average of **Unit 1** and has no bearing on Unit 2. Your design point should have been based on the OEM curves as stated above.

2. **Overheating**
Again, in the subject letter, you accuse IPSC of not providing ABT with information concerning the overheating of the original equipment burner barrels. In item 3 it states, "*Note that this was the first time ABT was advised of this overheating condition with the OEM burners and had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel.*"

Materials Selection
How can you make this assertion? It is ABT's responsibility to design for the environment that the burners will operate in. In ABT's contractual proposal, Section 6.4, Part C - Division C3 it states "*There are no environmental limitations to the coal burners.*" Under the Explanatory Comment you further state, "*The reason for stating that there are no environmental limitations to the coal burners is that the stainless steel castings and plate facing the fire, ASTM 297 Gr He or 309 will not deteriorate at temperatures of at least 2,000 °F. Consequently, ABT does not consider operation of its design in your boiler to have any environmental limitations. The conditions are such that no material will operate anywhere near its limit. In fact, ABT has placed no such limitation on any retrofit ABT has done.*"

You must have been aware of IPSC's concern about high temperatures at the burner front since we paid an extra $40,800 for a material upgrade to 253MA on burner components due to heat concerns. We specified and paid for two (2) thermocouples to be installed on each burner for temperature monitoring even when you assured us none were needed.

The OEM burners in our Unit 1 were upgraded from a 25-inch long, 309 SS tip to a 33-inch long, higher grade cast tip to prevent thermal degradation of the nozzle tips. This was done only after six years of operation. For your nozzle tips to fail within two years of startup is unacceptable especially given your contractual warrantee of 48 months for workmanship and quality of the coal nozzle tips (refer to Section 4.1 of ABT's proposal).

3. **Coal-Nozzle Tip**

In the subject letter, you state that, "We advised in the meeting that the temporary repairs that IPSC wanted to implement would not resolve the barrel overheating and nozzle cracking problem. ABT explained that it would be necessary to extend the carbon/stainless steel weld point further from the furnace by replacing a section of the carbon steel barrel with a stainless steel barrel."

Stainless-to-Carbon Steel Weld Location

A comparison of the distance from the centerline of the wall tubes to the tip-to-carbon steel transition between the ABT design and the upgraded OEM nozzles is within 1 inch. You imply in your April 10, 2006 letter that you are just beginning to understand that burner fronts with large throats can cause overheating in the barrel. Please keep in mind that both our units have been running with the same coal and similar loads over the past two years. Unit 1 burners have not experienced the thermal damage witnessed in the ABT burners on Unit 2. In fact, Unit 1 has been running for 14 years with similar distance from water wall tubes to the weld transition line without failure. Something in your design is not right.

Out-of-Service Cooling Air

Your subject letter (on page 3) implies that lack of cooling air flow on out of service burners could have lead to the damage witnessed in the coal-nozzle tips. If we did operate with no cooling air, you could hardly blame us since ABT did not provide us with operating guidelines for out of service flow. Out of service air flow is a system loss and was therefore one of the considerations for buying ABT burners since you claimed that cooling air was not needed. In reality, we have always used cooling air flow and the burners still failed.

Per your proposal, Section 3.6 ABT Field Services; ABT dispatched an engineer for field installation and testing support to assist during the initial stages of installation, startup, check-outs and during optimization of the new combustion equipment. At no time during this commissioning work was cooling-air flow an issue. The ABT personnel on the job stated that out-of-service cooling air was not required with the ABT design. This was consistent with ABT's claim in their proposal of no environmental limitations. On this advice IPSC left the out of service cooling air damper positions at the previous set points in the controls. Only in the April 10, 2006 ABT letter was cooling air on out of service burners a concern. Knowingly or unknowingly, ABT has misled IPSC on the ability of their burner to withstand the environment of operation.

4. **Erosion**

In Section 2.2 of your contractual proposal it states that; "*The segmented coal nozzle has an open design with no obstructions to wear or to collect coal,*" and in 7.2; "*In the ABT design, all wear is limited to the wear-resistant devices in the elbow. The Opti-flow system eliminates coal ropes and produces a nearly uniform fuel/air mix with axial flow downstream of the elbow. Therefore, the only erosion-prone areas will be located within the elbow.*"

Clearly, we are experiencing erosion issues that neither IPSC nor ABT anticipated. We have addressed the question of excessive coal velocities in number 1 above. The fact that we have experienced erosion-related failures in our coal barrels, nozzle tips and sweep elbows in less than two years of operation is unacceptable especially in light of the assurances you gave us as referenced in the paragraph above and the warrantee of 48 months on the nozzle tips.

> The erosion issue gets back to design. You assert that the only wear parts will be in the x-vane diffuser yet our burners are wearing through the sweep elbows, the coal barrel and at the coal-nozzle tip. Our notes from our meeting with you and Mr. Ferrara indicate that you admit that you did not conduct a CFD model of the sweep-elbow/x-vane diffuser combination. We maintain, based on experience, that there is a flaw in this design.

IPSC would like to remind ABT that the responsibility to provide a burner design that will function properly in the operating environment of our furnaces lies with ABT not IPSC. Again, we request a favorable response to these claims by August 18, 2006.

Sincerely,

George W. Cross

George W. Cross
President and Chief Operating Officer
Intermountain Power Service Corporation

[redacted]:jmj

Attachments

271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978
P 908.470.0470
F 908.470.0479
www.advancedburner.com

August 16, 2006

Mr. George W. Cross
President and Chief Operations Officer
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Subject: Intermountain Generating Station Unit 2 Low NO_x Burners

Ref: Response to IPSC Letter Dated July 31, 2006

Dear Mr. Cross:

Having reviewed the referenced letter it is clear that there are significant misunderstandings regarding our positions, design conditions, evaluations of the problems being reported and our actual experience. It is regrettable that you choose to claim that ABT has fallen "short of the claims, guarantees and warrantees" provided for in the contract. In truth, all of our claims have been and are correct and we have met or exceeded all performance guarantees expressed in the contract; in addition to our predictions. It now appears that, regardless of our previously supplied objective comments, which we do not consider differences of opinions or viewpoints, you have chosen to make a warrantee claim for damage that you have been led to believe is ABT's fault.

Regarding our claims: if IPSC personnel have not already done so, we suggest that they contact all of the references we have provided as part of the proposal phase. You will find that all of the claims we made were true at that time and since.

Regarding performance guarantees: You may be aware that our service manager, Tarkel Larson, was at the site to start up the boiler. Although we were ready at that time to commence optimization, the station was not. The reason we were given was that the test grid was not ready and we should leave and would be called back "soon". After nearly six weeks we called to enquire when we could return to perform the testing. At that time we were told that the station was attempting to tune our burners using new flame scanners and burner air flow measurements and those attempts were not successful. In fact we were told there must be something wrong with our burners since attempting to move the flame so as to see changes in the new scanners was proving unsuccessful. Had we been advised that this was the plant's intent, we would have advised against it. For the simple fact that we have gone to considerable extent to develop a low NO_x burner that produces a very stable flame, low NO_x, low CO and UBC and very good turndown. Once the grid was installed we demonstrated all guarantees in a matter of days. All retentions were then paid.

While it is not my intention to respond here to all the comments in your multi-page letter, I do have a few brief comments to make:

Overheating: The only concern that IPSC personnel ever expressed to ABT was overheating of the original B&W registers. IPSC insisted on substituting a high alloy steel, 253 MA, for the other carbon and stainless steels we normally use; despite our assurances that we have never experienced, with our registers, the high temperatures in the register locations that were of concern and that we saw no need to substitute exotic materials for our normal ones. Nevertheless, the plant chose to proceed with the 253 MA.

Subsequent to the startup at no time did the register temperatures exceed the normal values we have seen, thereby confirming our predictions.

However, as I noted in previous correspondence, at no time was ABT ever informed that high burner barrel temperatures had been experienced with the OEM burners and that the solution was adding an extension made of stainless steel; this is a completely different problem than the register temperature. Clearly ABT should have been advised of this history so that we could make our own design decisions as to how to deal with that problem (which we have never seen on any other B&W burners we have replaced; thereby indicating that there is something amiss at Delta). As you have noted it is not IPSC's responsibility to design our equipment; but as I have noted it is incumbent upon IPSC to provide us with any and all relevant information so that we can design to the proper conditions. Clearly, ABT was not provided all the relevant information.

Large Burner Throats: It seems clear that you have completely misunderstood my comments. No, we are not "just beginning to understand that burner fronts with large throats can cause overheating in the barrel." Quite the contrary: on installations of ours with large burner throats, none have ever experienced overheating problems on any part of the burner. We have installations on very hot pre-NSPS boilers with 52" throats that have been in service since the late 1990's with no such indications, let alone failures.

In fact there is a site that has our first installation in Vernal, Utah, Deseret's Bonanza #1, which has burners installed in 1997, has 54" throats and has had no problems of reliability. This unit typically operates at NO_x levels in the 0.35-0.4 range and is not equipped with overfire air. You should also note that when Deseret became aware that their operating conditions could change they asked us to do an evaluation of the new conditions and render an opinion (which we did at not cost to them) rather than make assumptions as to how our equipment would react under the new conditions. As a consequence, that plant has had no problems even though they have made major modifications to their operation.

To repeat: there is *no* ABT installation that suffers the problems that occur at Delta #2. Logic as well as common sense would dictate that the problem is not in the burner design but in the site-specific conditions that ABT was never notified about. The responsibility to provide the burner design conditions, and maintain them during operations, remains with the owner; in this case IPSC.

All of the above not withstanding, we have been very clear all along that we are willing to work with IPSC to address the situation as it now stands. I suggest that the only way this can be accomplished is by a direct meeting between you and me with no more than one or two of our respective staff members who are most familiar with this retrofit project.

If you are in agreement, please call me to finalize a meeting date (908-470-0720).

Sincerely,

Joel Vatsky, President

Cc: Sal Ferrara

JV-GC8-16-06.DOC

271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978
P 908.470.0470
F 908.470.0479
www.advancedburner.com

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GWC

MAY 15 2006

May 9, 2006

Mr. George W. Cross, President and Chief Operating Officer
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Subject: Intermountain Generation Station Unit 2 Low NO_x Burners, Contract 04-45606
IPSC April 24, 2006 Letter

Dear Mr. Cross:

Advanced Burner Technologies Corporation (ABT) is concerned that damage has occurred to the burners we have supplied. Although we deny IPSC claims that ABT has any responsibility, we do however remain committed to help IPSC. To this end we have been working closely with the Plant to identify the root causes that first became evident on June 27, 2005 with IPSC's Mr. J. Finlinson's email notification of the F3 burner fire.

We can understand that changes in operation (such as fuel supply) and occasionally information that can be important to the supplier may, through inadvertent oversight, not be provided to the supplier. In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels. There is no way any equipment designer can design for conditions of which they are not made aware by the owner.

The following items 1 through 5 of the subject Intermountain Power Service Corporation (IPSC) letter that describes problems identified by IPSC are as follows, with ABT responses added in bold text:

1. Erosion of the barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

   ABT response:
   The diffuser assembly, otherwise known as "x-vane", located in the elbow is a wear component, however it has worn more rapidly than the standard design we have in operation at all our other installations. ABT's proposal included supply of the standard x-vane design which eliminate the cleanout plug at the elbow's centerline; however, in early stages of the project IPSC requested a change in order to retain the existing port in the burner inlet elbow. ABT agreed to make the change but also advised IPSC that the standard x-vane as originally offered was a better, simpler, design. In any case, the accelerated wear to the x-vane assembly, and erosion of the barrel downstream of the long sweep elbow, is due to IPSC operation of their coal mills at higher flows than allowed by contract and the burner design. As stated in Proposal

2

Section 4.9, ...ABT will design the burners for the full load primary airflow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load. The design mill primary airflow (210,000 lb/hr) for fuel injector sizing was also confirmed early in the project with J. Vatsky 9/11/03 email correspondence to P. Halles.

It did not become evident that IPSC is running the mills at much higher flows than design until October 2005. IPSC's G. Christensen 10/27/05 email correspondence advised flows are as high as 285,000 lb/hr, which is more than 25% greater than the burner design flow agreed between IPSC and ABT. ABT's S. Ferrara responded immediately with 10/28/06 email advising effects of higher operating flows by degrading performance and increasing component wear.

Based on IPSC long term records of fuels burned (Mr. G. Christensen 11/2/05 email correspondence) IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than allowed by ABT's design. The lower than specified HHV (≤11,500 Btu/lb) results in overfiring of burners (higher than design air and coal flows) in order to maintain full load generation on the Unit.

2. Erosion of burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

ABT response:
Erosion of the burner nozzles is due to high velocities of the air/coal mixture in the nozzle, along with the higher coal loadings resulting from the lower heating value coal. This condition may be worse due to by denser coal streams being formed in the non-standard design of the x-vane assembly.

Had ABT known that IPSC intended to operate the mills at the current coal and air flows, the burner nozzles would have been designed accordingly resulting in lower nozzle velocities. ABT has not experienced nozzle erosion at any of its other installations where the mills are operating in the range for which the burner is designed.

In cases where it is known that erosive conditions exist (high velocity and/or highly abrasive fuel) ABT will apply erosion resistant materials in the fuel injector barrels as well as the inlet to the nozzles to maximize their longevity. This was not the case with IPSC as the coal was not considered to be highly abrasive and the contract defined flows result in relatively low air/coal velocity in the nozzle.

Had ABT been advised that such a fuel change and resultant mill operation was anticipated, we would have proposed the changes noted above.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

ABT response:
This is consistent with discussions held in the November 9, 2005 meeting at the Intermountain Generating Station where ABT explained that the carbon steel burner barrels were overheating upstream of the point where carbon steel barrel is welded to the stainless steel nozzle tip. The carbon steel is expanding at a higher rate than the

stainless casting causing the casting to rip at the weld and cracks to then form in the casting.

We advised in the meeting that the temporary repairs that IPSC wanted to implement would not resolve the barrel overheating and nozzle cracking problem. ABT explained that it would be necessary to extend the carbon/stainless steel weld point further from the furnace by replacing a section of the carbon steel barrel with a stainless steel barrel. IPSC advised in the meeting that the OEM burners originally provided on the Unit had experienced the same overheating problems witnessed on the ABT nozzles and the resolution was to extend the stainless steel portion of the barrel just as ABT is recommending. IPSC advised in the meeting that based on conditions observed during the recent October 2005 outage, it would not be necessary to implement ABT's recommendation to extend the carbon/stainless steel weld point back during the April 2006 outage.

Note that this was the first time ABT was advised of this overheating condition with the OEM burners and, had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel.

We have not experienced this type overheating problem on any of the ABT burner designs currently operating in the industry, which all have the carbon/stainless steel weld point in similar proximity to the furnace as is currently operating on the ABT burners at IPSC. The only time we have seen elevated temperatures on the carbon steel barrel is when the cooling secondary airflow to the burners was completely shutoff and we suspect that this may be happening at IPSC. We have suggested an investigative program to the Plant in order to determine if any operating conditions exist where insufficient cooling flow is available to the burners. In particular we believe that the compartmented windbox air control dampers may be too closed when the burner deck is out of service and have asked the Plant to investigate this. To date we have not had any response or been provided with any information.

4. Erosion of the ceramic lined long-sweep elbow and x-vane diffuser.

ABT response:
The ceramic lined long sweep elbows are original boiler equipment and were not replaced by ABT during the Low NOx Burner retrofit. The erosion of the x-vane diffuser is discussed in item 1 above and is a result of IPSC operating the coal mills at primary air and coal flows much higher than allowed by the contract.

The x-vanes are replaceable components and are expected to wear over a period of years. ABT has an on-going development project to identify the latest wear-resistant materials so that we can select those materials that best fit the specific fuel properties and flow conditions for each project. At the design fuel and flow conditions specified by the IPSC project, the x-vane assemblies supplied by ABT would last many years prior to needing replacement. The fuel and flow conditions that IPSC has been recently operating at, and has defined for the future, would require a change to material selection of ABT's x-vanes, at an increased cost, in order to minimize the type wear IPSC is experiencing of this component. Further the burner barrels would have to be lined and the nozzles replaced with new ones designed for the actual flows now being utilized.

4

5. One burner (F3) was completely replaced because it was damaged in a burner fire on June 25, 2005. After inspecting the damaged burner, we believe the fire was caused by a hole eroded in the burner barrel just after the elbow. We believe the hole allowed coal to enter the inner air sleeve and eventually catch on fire damaging the burner.

   ABT response:
   Due to the extent of fire damage on F3 burner, it was not possible to determine the cause although based on the photos provided by IPSC it seems to have started either in the coal pipe or at the burner inlet. We noted that the coal pipe upstream of the burner, where the pipe passes through the floor grating, in the area of the coal pipe shutoff valve also showed evidence of fire, leading us to question whether the valve was only partly open.

   As noted in J. Finlinson's 6/27/05 email, the IPSC operators were starting up the other Unit on June 25, 2005 at the time the fire started on F3 burner *and therefore did not* notice the high temperature alarms(well over 1600°F). It is not known how long the fire went *unnoticed* by the operators, however operator action to take the burner out of service would have prevented permanent damage to the burner components. F3 burner is the only one of 48 burners on the unit that suffered permanent damage from fire in over 2 years of operation. This being the case, it can only be concluded that the F3 incident is due to some type of operational malfunction rather than due to design defect in the burner.

The subject April 24, 2006 letter notes that IPSC "purchased the materials necessary to temporarily repair the burners." IPSC's letter also states "we are now requesting the following remedial actions from ABT according to the contract:"

1. With no additional IPSC reimbursement, ABT should make the necessary modifications to their design to solve all the problems we have experienced with the burners as outlined in this letter and to otherwise meet all the specifications of the contract.

   ABT response:
   The ABT burners are designed to the conditions of the contract and the problems experienced are due solely to IPSC operating conditions being outside those specified. This type of operation has voided the ABT "Guarantees and Warranties" as stated in Proposal Q03013, Section 4.9 (Contract Article III: Part C). ABT has already made the necessary design modifications to meet the new operating conditions provided by IPSC and has provided the Plant with a proposal in November 2005.

2. With no additional IPSC reimbursement, ABT should supply the necessary materials and manpower to install those design changes on all 48 of the IGS Unit 2 burners. This work should be done on the next Unit 2 major outage scheduled for the Spring of 2008.

   ABT response:
   ABT has already proposed to supply replacement fuel injectors for all 48 of the IGS Unit 2 burners and, as noted above, has designed these to the new conditions provided by IPSC. IPSC shall install the ABT supplied materials at IPSC cost. ABT's offer made during the November 9, 2005 meeting remains to supply the new fuel injectors to IPSC at a discount. We offer the discount as a good will gesture to work with IPSC and resolve the unexpected problems amicably.

5

As a further good will gesture, ABT will maintain the November 2005 price if we receive the Purchase Order and initial payment by June 15, 2006 for delivery by December 2006.

3. ABT should reimburse IPSC for the burner purchased to replace the fire damaged F3 burner. We believe the fire was the direct result of an ABT design flaw that allowed rapid erosion of the burner barrel.

ABT response:
Damage to the F3 burner is due solely to operator inaction to control room alarms, allowing a burner fire to progress for long period rather than removing the burner from service to prevent permanent damage. The ABT design is not flawed and the rapid erosion problem is due to IPSC operating the burners at flow conditions outside the contract specifications.

4. ABT should reimburse IPSC for the materials purchased from ABT to repair the burners during the April 2006 Unit 2 outage.

ABT response:
During the November 9, 2005 meeting, ABT advised that the fuel injectors would require redesign to support operation at the higher flow rates. ABT also presented the new design arrangement during the meeting, and proposed to supply forty-eight fuel injectors for installation during the April 2006 outage. IPSC advised at that time that they were only interested in implementing temporary repairs during the April 2006 outage and intended to purchase the replacements designed for the new conditions for the next major outage. The cost for materials to make the temporary repairs will not be reimbursed by ABT to IPSC.

To summarize: the damage that has occurred is a direct result of changes in Plant operation (fuel and mill conditions) and failure of IPSC to inform ABT of the original burner barrel overheating problem that could have been addressed in the initial design phase.

AT remains committed to support IPSC in resolving these issues and hadprovided a proposal to do so as soon as we were advised of the actual operating conditions.

Please contact Sal Ferrara at 908-470-0721 to discuss any question you have on this matter.

Sincerely yours,

Joel Vatsky
President and CEO

Cc: Sal Ferrara

271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978
P 908.470.0470
F 908.470.0479
www.advancedburner.com

ADVANCED BURNER TECHNOLOGIES

GWC

MAY 15 2006

May 9, 2006

Mr. George W. Cross, President and Chief Operating Officer
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Subject: Intermountain Generation Station Unit 2 Low NO_x Burners, Contract 04-45606
IPSC April 24, 2006 Letter

Dear Mr. Cross:

Advanced Burner Technologies Corporation (ABT) is concerned that damage has occurred to the burners we have supplied. Although we deny IPSC claims that ABT has any responsibility, we do however remain committed to help IPSC. To this end we have been working closely with the Plant to identify the root causes that first became evident on June 27, 2005 with IPSC's Mr. J. Finlinson's email notification of the F3 burner fire.

We can understand that changes in operation (such as fuel supply) and occasionally information that can be important to the supplier may, through inadvertent oversight, not be provided to the supplier. In this case two critical items were not provided to ABT: the expected fuel change that resulted in significant increases in fuel and primary air flow, and the overheating of the original equipment burner barrels. There is no way any equipment designer can design for conditions of which they are not made aware by the owner.

The following items 1 through 5 of the subject Intermountain Power Service Corporation (IPSC) letter that describes problems identified by IPSC are as follows, with ABT responses added in bold text:

1. Erosion of the barrel just downstream of the long-sweep elbow. This has occurred on every burner and we believe it is caused by the diffuser assembly you designed and supplied that is located in the elbow.

   ABT response:
   The diffuser assembly, otherwise known as "x-vane", located in the elbow is a wear component, however it has worn more rapidly than the standard design we have in operation at all our other installations. ABT's proposal included supply of the standard x-vane design which eliminate the cleanout plug at the elbow's centerline; however, in early stages of the project IPSC requested a change in order to retain the existing port in the burner inlet elbow. ABT agreed to make the change but also advised IPSC that the standard x-vane as originally offered was a better, simpler, design. In any case, the accelerated wear to the x-vane assembly, and erosion of the barrel downstream of the long sweep elbow, is due to IPSC operation of their coal mills at higher flows than allowed by contract and the burner design. As stated in Proposal

Section 4.9, ...ABT will design the burners for the full load primary airflow, per mill, as per the OEM mill curves, with one mill out of service at typical full load. The design mill primary airflow (210,000 lb/hr) for fuel injector sizing was also confirmed early in the project with J. Vatsky 9/11/03 email correspondence to P. Hailes.

It did not become evident that IPSC is running the mills at much higher flows than design until October 2005. IPSC's G. Christensen 10/27/05 email correspondence advised flows are as high as 265,000 lb/hr, which is more than 25% greater than the burner design flow agreed between IPSC and ABT. ABT's S. Ferrara responded immediately with 10/28/05 email advising effects of higher operating flows by degrading performance and increasing component wear.

Based on IPSC long term records of fuels burned (Mr. G. Christensen 11/2/05 email correspondence) IPSC has operated for an extended period of time (September 2004 through April 2005) on coals having significantly lower HHV properties than utilized by ABT in design. The lower than specified HHV (≤11,500 Btu/lb) results in overfiring of burners (higher than design air and coal flows) in order to maintain full load generation on the Unit.

2. Erosion of burner nozzles where it divides into the six segments just prior to discharge. Every burner showed significant erosion with many having multiple holes.

ABT response:
Erosion of the burner nozzles is due to high velocities of the air/coal mixture in the nozzle, along with the higher coal loadings resulting from the lower heating value coal. This condition may be worse due to by denser coal streams being formed in the non-standard design of the x-vane assembly.

Had ABT known that IPSC intended to operate the mills at the current coal and air flows, the burner nozzles would have been designed accordingly resulting in lower nozzle velocities. ABT has not experienced nozzle erosion at any of its other installations where the mills are operating in the range for which the burner is designed.

In cases where it is known that erosive conditions exist (high velocity and/or highly abrasive fuel) ABT will apply erosion resistant materials in the fuel injector barrels as well as the inlet to the nozzles to maximize their longevity. This was not the case with IPSC as the coal was not considered to be highly abrasive and the contract defined flows result in relatively low air/coal velocity in the nozzle.

Had ABT been advised that such a fuel change and resultant mill operation was anticipated, we would have proposed the changes noted above.

3. Severe cracking and structural failure of the burner nozzle which originates from the weld of the nozzle to the burner barrel. The cracking of the nozzles was so severe on 15 of the 48 burners on a recent inspection that those 15 nozzles had to be removed and replaced.

ABT response:
This is consistent with discussions held in the November 9, 2005 meeting at the Intermountain Generating Station where ABT explained that the carbon steel burner barrels were overheating upstream of the point where carbon steel barrel is welded to the stainless steel nozzle tip. The carbon steel is expanding at a higher rate than the

stainless casting causing the casting to rip at the weld and cracks to then form in the casting.

We advised in the meeting that the temporary repairs that IPSC wanted to implement would not resolve the barrel overheating and nozzle cracking problem. ABT explained that it would be necessary to extend the carbon/stainless steel weld point further from the furnace by replacing a section of the carbon steel barrel with a stainless steel barrel. IPSC advised in the meeting that the OEM burners originally provided on the Unit had experienced the same overheating problems witnessed on the ABT nozzles and the resolution was to extend the stainless steel portion of the barrel just as ABT is recommending. IPSC advised in the meeting that based on conditions observed during the recent October 2005 outage, it would not be necessary to implement ABT's recommendation to extend the carbon/stainless steel weld point back during the April 2006 outage.

Note that this was the first time ABT was advised of this overheating condition with the OEM burners and, had this been conveyed to ABT during the bidding or design phase of the project, we would have extended the stainless steel portion of the barrel.

We have not experienced this type overheating problem on any of the ABT burner designs currently operating in the industry, which all have the carbon/stainless steel weld point in similar proximity to the furnace as is currently operating on the ABT burners at IPSC. The only time we have seen elevated temperatures on the carbon steel barrel is when the cooling secondary airflow to the burners was completely shutoff and we suspect that this may be happening at IPSC. We have suggested an investigative program to the Plant in order to determine if any operating conditions exist where insufficient cooling flow is available to the burners. In particular we believe that the compartmented windbox air control dampers may be too closed when the burner deck is out of service and have asked the Plant to investigate this. To date we have not had any response or been provided with any information.

4. Erosion of the ceramic lined long-sweep elbow and x-vane diffuser.

ABT response:
The ceramic lined long sweep elbows are original boiler equipment and were not replaced by ABT during the Low NOx Burner retrofit. The erosion of the x-vane diffuser is discussed in item 1 above and is a result of IPSC operating the coal mills at primary air and coal flows much higher than allowed by the contract.

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1. With no additional IPSC reimbursement, ABT should make the necessary modifications to their design to solve all the problems we have experienced with the burners as outlined in this letter and to otherwise meet all the specifications of the contract.

   ABT response:
   The ABT burners are designed to the conditions of the contract and the problems experienced are due solely to IPSC operating conditions being outside those specified. This type of operation has voided the ABT "Guarantees and Warranties" as stated in Proposal Q03013, Section 4.9 (Contract Article III: Part C). ABT has already made the necessary design modifications to meet the new operating conditions provided by IPSC and has provided the Plant with a proposal in November 2005.

2. With no additional IPSC reimbursement, ABT should supply the necessary materials and manpower to install those design changes on all 48 of the IGS Unit 2 burners. This work should be done on the next Unit 2 major outage scheduled for the Spring of 2008.

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5

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To summarize: the damage that has occurred is a direct result of changes in Plant operation (fuel and mill conditions) and failure of IPSC to inform ABT of the original burner barrel overheating problem that could have been addressed in the initial design phase.

AT remains committed to support IPSC in resolving these issues and hadprovided a proposal to do so as soon as we were advised of the actual operating conditions.

Please contact Sal Ferrara at 908-470-0721 to discuss any question you have on this matter.

Sincerely yours,

Joel Vatsky
President and CEO

Cc: Sal Ferrara

6

4.9

- **Mill Performance:**
  Air Flow: The low NO_x burners will be designed to slave to the mills' operation in that the fuel injector will be sized to follow the mills' primary air flow characteristic. Consequently, ABT will design the burners for the full load primary air flow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load. Primary air flow must reduce as mill load decreases. PA flow will be determined during pre-retrofit testing defined in this proposal Section 2.4.

  Coal/PA Flow Balance: The balance between coal pipes within a given mill is to be within ±10% of the mean for that mill. (ABT recognizes that this is difficult to accomplish on all mills. Consequently, we will accept one of the eight mills being outside this range, to maximum of ±15%).

- **Fineness:** 99.5% < 50 Mesh and 70% < 200 mesh; all mills simultaneously.

- **Coal Properties:** Western U.S. bituminous:
  HHV > 11,500 Btu/lb; N_2 ≤ 1.2%; FC/VM ≤ 1.2; Ash ≤ 12%

NOx guarantee pt (see ABT Proposal 4.4)

4.10 Burner Load Variation

The nominal burner heat input at boiler full load with one mill out of service, is approximately [redacted] MBtu/hr. 50.09 TPH

less

The ABT low NO_x burner's flame will remain stable at a load greater than 220 MBtu/hr, and less than 95 MBtu/hr. 57.39 TPH

greater 24.78 TPH

Maximum secondary air flow at 220 MBtu per hour and 15% excess air, with 10% OFA flow will be no less than 124, 240 lb/hr.

Minimum secondary air flow will be determined by balancing the burner stoichiometry against the overfire airflow necessary to maintain minimum NO_x. Note that 45% load is below the steam temperatures control range listed on the B&W summary performance sheet.

4.11 Ash Patterns

The low NO_x system shall not increase or adversely alter the pattern of ash deposits on the furnace walls or high temperature superheater tubing such that existing soot blowing and/or steam de-superheating sprays cannot maintain tube cleanliness or steam temperatures. Furthermore, the burners shall not cause increased buildup of slag deposits around the burner openings (i.e., eyebrows).

C1

7

- **NO_x shows only a slight dependence on BZLR for boilers with ABT low NO_x burners. The BZLR for Intermountain is similar to Deseret, which show NO_x emissions of 0.35. This data indicates that a NO_x level of 0.33 is attainable for Intermountain at 15% excess air and OFA ports closed.**

2.2 Opti-Flow™ Low NO_x Burner:

ABT's Opti-Flow™ low NO_x burner generates a very bright, intense flame that does not look like the classical low NO_x flame: its intensity is more akin to that of classical turbulent burners. Yet, the NO_x levels are typically more than 35 percent lower than those generated by competitors' low NO_x burners that ABT has replaced firing bituminous coal and more than 40% lower than those firing PRB. This NO_x reduction result has been attained without any additional UBC penalty.

The Opti-Flow™ low NO_x, flame stabilization nozzle is the key element of the fuel injector for attaining excellent flame stability along with minimum NO_x. Excellent flame stability is achieved by incorporating external flame stabilizers surrounding each nozzle segment. **The segmented coal nozzle has an open design with no obstructions to wear or to collect coal.** Nearly uniform fuel distribution around the burner nozzle circumference is also obtained, which provides significant aid in attaining minimum NO_x and UBC simultaneously. Pressure drop is minimal and **there are no components in the coal path that would be subject to wear, coal accumulation, or coking.**

Advanced Burner Technologies utilizes high quality stainless steels for all parts of the fuel injector that face the furnace, as well as stainless steel castings for all complex parts. **The result is high reliability and excellent longevity of the burners.**

ABT's Opti-Flow™ dual register is an innovative design that provides the operator with the flexibility of optimizing inner and outer zone swirl values, and the air flow split between the inner and outer zones independently of swirl. This is accomplished with a manually adjustable inner air damper and represents a significant improvement over other dual register designs. A fixed vane swirler is attached to the outer barrel of the fuel injector to impart swirl to the inner air zone.
In order to be most effective, any low NO_x burner must operate in an external environment that provides proper conditions needed for optimal combustion at each burner. There are two operational areas that are extremely important for best burner performance with minimum flame length:

a) Known and accurately controlled primary air flow along with other sources of air which enter the fuel injector: such as auxiliary air and seal air. **ABT has sized the fuel injector proposed here based on the PA flow contained in the OEM mill curves for Intermountain Unit 2.** This primary air flow must be verified during pre-retrofit testing.

C2

8

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Garry Christensen" <Garry-C@ipsc.com>
Date: 10/28/2005 8:32:59 AM
Subject: RE: The remaining pictures

Thanks Garry.
The entire fuel injector assembly can be unbolted from the burner cover plate and removed as one piece (with inner zone damper and fixed vane spinner attached. We will provide our recommendations and an arrangement drawing for discussion on design for upgrading fuel injector & elbow design to a longer wear life. The pictures and descriptions you provided are very helpful in that respect.

In response to Dean's phone question yesterday morning, the fuel injector was designed based on the OEM Mill "Present Curve" (see email attachment) for full load, with one mill out of service. Based on the curve the burner design point is 62 MCFM PA flow @ 102 MLB/hr coal flow. Operating at higher flow rates than designed will result both in degrading performance as well as increase wear.
Sal

-----Original Message-----
From: Garry Christensen [mailto:Garry-C@ipsc.com]
Sent: Thursday, October 27, 2005 5:33 PM
To: sal@advancedburner.com
Subject: The remaining pictures

Sorry about that, the remaining pictures are attached. Are the nozzles replaceable and if so can they be removed with the tip attached? Also, what other components need to be unattached?

We do want you to look into a ceramic lined coal barrell/nozzle with a different engineered tip. ie less angle and modification of the X-vane. I hope you will be able to come out soon and sit down and discuss the issues so we can come up with a game plan and get needed parts/new equipment in time for April's outage.

CC: "Dean Wood" <Dean-W@ipsc.com>

pt @ 6400 kpph steam Flow
pt on curve 51 TPH
7 pulv I/c
62 mCFM → 242,172 lb/
+5% 254,281 lb/

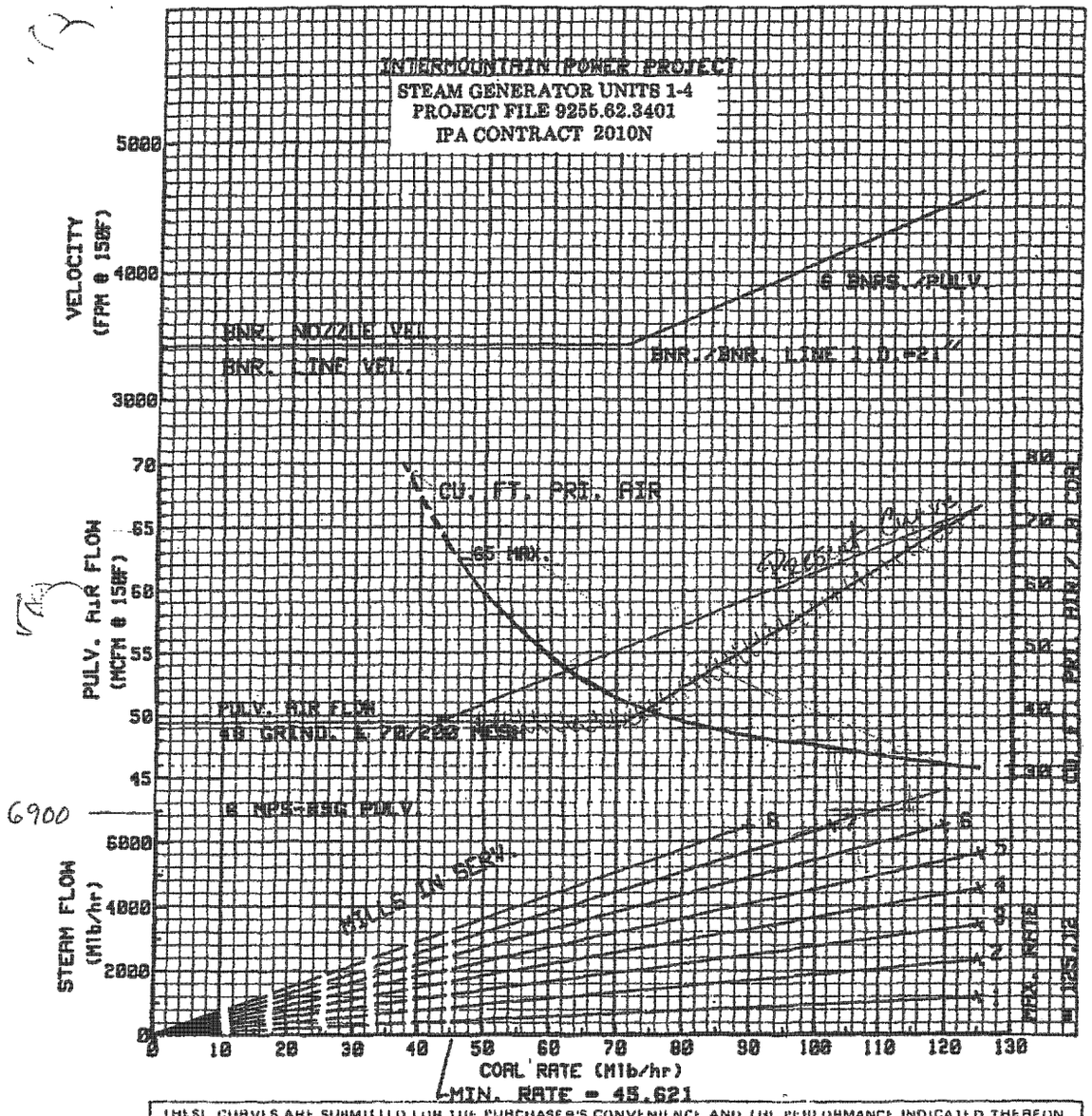
@ 6900 kpph
pt 110 mlb/hr → 55 TPH
63.5 mCFM @ 150°F
⇒ 248,031 lb/hr
+5% 260,432 lb/hr

@ 115% [illegible] BTU

PG 896-4

Babcock & Wilcox

CONTRACT INFORMATION SHEET



Full load 360 TPH required @ 6.4 million lb/h

THESE CURVES ARE SUBMITTED FOR THE PURCHASER'S CONVENIENCE AND THE PERFORMANCE INDICATED THEREON SHALL NOT BE OFFERED BY THE COMPANY OR CONSTRUED BY THE PURCHASER AS A PROPOSAL OR CONTRACT OBLIGATION.

DRAWN BY	DATE	APPROVED BY	DATE	A.O.
J. NEIDERT	2-1-82	RBH	2-5-82	

REL. NO. AND DATE	CONTRACT NO.	FILE NO.
1 9-8-82	334-0614	RB-614

TITLE – PULVERIZER-BURNER COORDINATION CURVES - CORL (B)

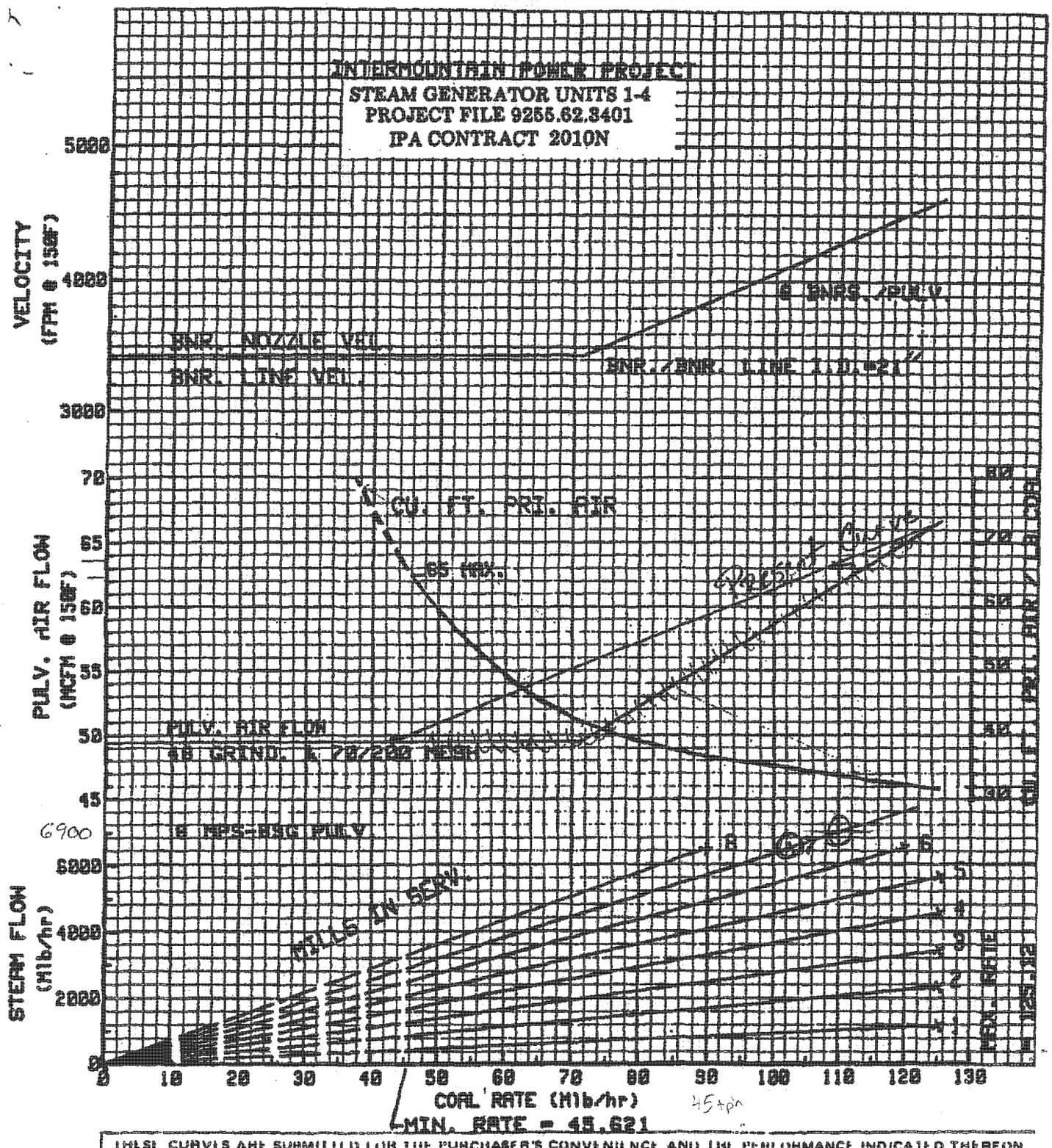
CIS– 101.05

IP7021363

PG 896-4

Babcock & Wilcox

CONTRACT INFORMATION SHEET



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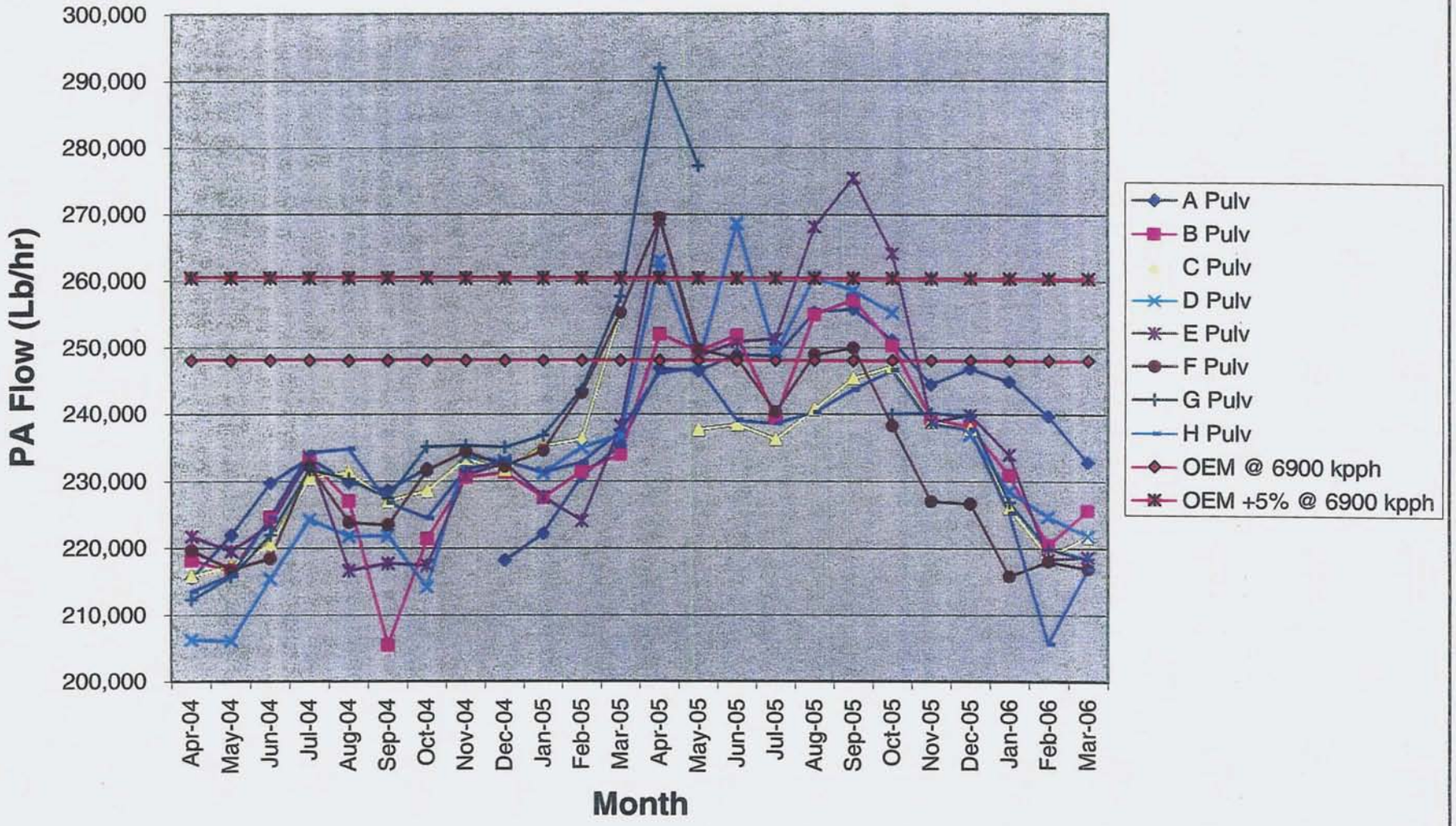
DRAWN BY	DATE	APPROVED BY	DATE	A.O.
J. NEIDERT	2-1-82	RBP	2-5-82	C3

REL. NO. AND DATE	1 9-8-82	CONTRACT NO.	FILE NO.
		334-0614	RB-614

TITLE – PULVERIZER-BURNER COORDINATION CURVES - COAL (B)

CIS- 101.05

Average monthly PA flow with coal flow > 34 TPH



11

From: "joel" <joel@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: Thu, Sep 11, 2003 12:52 PM
Subject: Re: PA Mass Flow

OK: You initially had lb/hr I did know if that was a typo or just the wrong number.

We'll use 210,00 lb/hr as the design flow for the fuel injector sizing.

Thanks,

When do you need the dwg info you asked for?

----- Original Message -----
From: "Phil Hailes" <Phil-H@ipsc.com>
To: <joel@advancedburner.com>
Sent: Thursday, September 11, 2003 2:04 PM
Subject: Re: PA Mass Flow

> 3500 lbs/min is the average rate that Unit 1 at 950 MW is running at
> today with 7 mills. What specified condition are you requesting?
>
> >>> "joel" <joel@advancedburner.com> 9/11/2003 12:08:23 PM >>>
> Phil: this number is not correct. PA flow for mills of this size is in
> the
> 100,000's lb.hr per mill.
>
> It is not an approximate value we need; but the actual quantity under
> the
> specified condition.
>
> Please recheck this.
>
> Joel
>
>
> ----- Original Message -----
> From: "Phil Hailes" <Phil-H@ipsc.com>
> To: <joel@advancedburner.com>
> Sent: Thursday, September 11, 2003 12:25 PM
> Subject: PA Mass Flow
>
>
> > At 950 MW with 7 mills, the PA mass flow is approximately 3,500
> lbs/hr
> > per mill.
> >
> > >>> "joel" <joel@advancedburner.com> 9/10/2003 1:16:18 PM >>>
> > Phil:
> >
> > We need ASAP the following:
> >
> > What is the primary air flow per mill with the boiler at full load

12

> with
> > 7 mills in service? This value will set our nozzle sizing..
> >
> >
> >
> > Joel Vatsky
> >
> >
> >
>
>

CC: "Onaitis, Chuck" <Chuck@advancedburner.com>, "Ferrara, Sal N." <Sal@advancedburner.com>

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Executive Summary and Philosophy

Advanced Burner Technologies Corporation is pleased to offer this proposal to Intermountain Power Service Corporation to supply and install state-of-the-art low NO_x burners for the Delta Unit #2 boiler. The specification lists several western bituminous coals, none of which, either singly or in the combinations specified, present any problem for ABT. The NO_x guarantee is 0.33 lb/MBtu is based upon what we understand to be the worst coal, SUFCO, which currently yields NO_x of about 0.45. Consequently, the NO_x will be reduced by at least 25% under equivalent operating conditions: 15% excess air and no overfire air flow. With 10% OFA flow, NO_x will be reduced to about 0.29 and with 20% to <0.25.

These values are based upon actual field experience with boilers of various sizes firing fuels ranging from lignite to PRB to eastern and western bituminous coal, as well as bit/PRB mixtures; and equipped with ABT's low NO_x burners only or these burners plus our OFA system. Consequently, we have a very high degree of confidence that these values can be attained in operation at Delta #2.

Under contract to ABT, Airflow Sciences Corporation will perform CFD models of the windboxes. This will enable us to optimize the secondary air distributions within the compartmented windbox design.

This proposal includes complete mechanical and electrical installation of all ABT supplied equipment. ABT's installation partner is Maintenance Enterprises, Inc., whose General Manager, Mike Simonds, has worked with ABT on several low NO_x conversions. These conversions include the turn-key supply and installation of low NO_x burners and overfire air systems at two 540 MW Kentucky Utilities boilers and installation of our burners on another 500MW unit at Deseret Generation & Transmission Coop in Vernal Utah. MEI, under Mr. Simonds' direction, will do an exemplary job of installing the ABT equipment.

We have the utmost confidence that the guarantees we have offered will be met.

Joel Vatsky, President
Advanced Burner Technologies Corp

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Jul-03 coal sampled May 2003

Weighted Totals

Mine	sampled Total Tonnage	% of Total	% Na2O	HGI	Softening Temp	HHVC Btu/lb	% H20	% Ash	% Volatile	% Fixed Carbon	% Sulfur
Genwall Resources	27,501.08	5.81	2.04	45.5	2,148	12,426	6.95	8.51	39.04	45.50	0.67
Skyline (Product B) trucks	0.00	0.00	0.97	43.7	2,137	12,562	5.51	6.51	43.20	44.78	0.40
SUFCO (Product A)	195,613.19	41.35	2.96	42.4	2,122	11,292	8.37	11.06	37.57	43.00	0.39
Andalex	64,932.12	13.73	1.12	42.1	2,237	12,084	5.65	10.07	37.27	47.01	0.60
Andalex AMQ	0.00	0.00	0.84	39.1	2,277	11,981	6.64	9.44	34.78	49.14	0.56
West Ridge Resources	47,378.20	10.01	1.16	46.4	2,200	12,848	5.75	7.46	37.06	49.73	1.13
West Ridge Resources spc	27,929.48	5.90	0.94	45.9	2,234	13,069	5.22	7.07	37.53	50.18	1.18
Coastal-Dugout	26,777.20	5.66	0.48	40.4	2,357	11,977	5.80	11.45	35.72	47.03	0.68
Arch-Dugout (product B)	82,943.41	17.53	1.37	41.7	2,217	11,826	6.49	10.82	36.38	46.31	0.56
Arch (spot)	0.00	0.00	0.49	39.3	2,299	11,959	6.22	10.96	33.66	49.16	0.74
Totals	473,074.68	100.00	1.94	42.91	2,184	11,860	6.99	10.16	37.25	45.60	0.60

5. Burner Design: Burners provided for use at IGS shall adhere to the following provisions:

   a. Within the design phase of the Work, Contractor shall review all operational impacts on associated equipment and systems such as fans, pulverizers, dampers, etc. Any concerns regarding operating limitations or increase power demands noted within the modeling/design phase shall immediately be brought to the attention of the IPSC Contract Administrator.

   b. Burner design and fabrication methodologies shall emphasize speed and ease of installation. The burner nozzles shall interface directly with the existing burner line flanges.

   c. Burners shall be provided with combustion air flow sensors providing individual burner air flow indication in each annulus on each burner. Pre-wired panels, signal transducers, and displays shall be provided for displaying flow for each burner locally. Terminals shall be designed and provided within each panel for routing signals remotely. IPSC will have the responsibility to route the flow signals from the local panels to the control room if desired.

   d. Burners shall provide for local manual air balance control, both between registers within each burner and between burners within a row. The registers shall remain operable under all operating conditions for at least the durations noted in Division C2, Burner and Scanner Performance Guarantees.

   e. Temperature sensors installed at two (2) locations on each burner shall be provided and routed to a local cold-junction box at each burner level. The sensors shall be located in accordance with the direction of Contractor to identify and track the hottest temperatures occurring at the burner in both the in-service and out-of-service condition. Individual burner temperatures shall be provided at the local cold-junction boxes. Termination space shall be provided within the local cold-junction boxes for continuation of the circuits remotely for indication, monitoring, and alarm within the plant data acquisition system by IPSC as desired.

   f. The burner assemblies shall be fabricated of quality material sufficient to withstand the significant thermal stresses occurring within the windbox as a result of both radiant and convective heating. Any deformation causing malfunction of register assemblies or misdirection of flow through the burner within the period of guaranteed operability shall be repaired at the earliest possible opportunity and charged to Contractor.

g. Experience-based and verified wear-life shall be quoted within the bid for all burner components. No component shall last less than four (4) years before requiring rebuild, restoration, or replacement.

h. Burners shall be designed to operate continuously by IPSC without detrimental effects on boiler performance and steam side flexibility, within the ranges of carbon monoxide, unburned carbon, nitrogen oxides, and excess air specified in Division C2, Burner and Scanner Performance Guarantees.

i. Burners shall be designed for installation within the existing burner openings without pressure part modifications, unless clearly noted otherwise within the Proposal.

j. Burners shall be designed such that stable flame ignition occurs at the nozzle discharge.

k. Burners shall be designed for continuous operation with preheated air at an air heater outlet temperature of 750°F. This does not account for radiant and other heating sources.

l. Burners shall be equipped with an aspirated observation/viewing port to permit inspection of the flame. If necessary for flame diagnostics and adjustment, multiple observation doors shall be furnished. Doors shall be designed to permit observation during any load condition. Contractor (ABT) shall include one (1) port per burner assembly with observation glass to view flame. Each port will be equipped with purge air connection and ball valve should the need arise to purge the view pipe.

m. Burners shall include, and shall be provided with, new seal/cooling air piping and fittings, including a ball valve, from the burner connection to the header piping.

n. Air register operating mechanisms, joints, seals, slides, and linkages shall not be subject to binding from poor design, differential expansion, or from the accumulation of fly ash and shall remain operational without internal lubrication.

o. Air flow volume adjustment within each zone of the burner shall not be controlled with the same device controlling air swirl or spin within any air zone.

p. Burners shall be capable of stable operation continuously from 45 percent to 115 percent of rated BTU output of the burner without supplemental fuels.

6. Flame Detection System Design: The flame scanning system shall, as a minimum, include the following provisions:

If go with their rated BTU 192 MBTU/hr → 50.09

115% → 57.5 TPH

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PART C- DIVISION C2

BIDDING DOCUMENTS - PROPOSAL SCHEDULE

1. Proposal is hereby made to furnish and deliver to IPSC **Unit 2 Low NOx Burners**, F.O.B. IPSC dock, full freight allowed in accordance with **Specifications 45606**, the following:

   a. Burner and Scanner Performance: The new burners shall provide for a continuous boiler operation of 6,900,000 pounds/hour output, 1,005°F superheat and 1,005°F reheat temperature under all operating conditions. Bidders shall state the following burner and scanner performance guarantees and submit with the bid package:

BURNER AND SCANNER PERFORMANCE GUARANTEES	
Maximum Burner Nox and CO Production Under All Modes of Operation:	NOx=0.33 lb/mbtu CO=200 ppm
Maximum Burner BTU Throughput:	> 220 MBtu/hr
Burner and Scanner System Temperature Tolerance and Thermal Degradation Life:	Burner Tip=2000°F Scanner Electronic=140°F
Time Within Which Burner Register Assembly Shall Remain Fully Operable By Hand:	Past Guarantee Period
Combustion Zone Stability (Ignition Location/Stability, Flame Shape/Color):	Bright Flame in throat
Ash Deposition (At Burner Throat, OFA Ports, and Superheat Pendants:	Burner Throats & SH No add'l from current
Maximum Burner Out-Of-Service Cooling Air Requirements (CFM Per Compartment):	Scanners= 15 SCFM at 10"W.C.
Minimum In-Service Air Flow With Associated Emissions (Assuming 10 Percent Total Overfire Air Flow):	See Proposal Sec. 4
Maximum In-Service Air Flow With Associated Emissions (Assuming 10 Percent Total Overfire Air Flow):	See Proposal Sec. 4
Maximum Wear Life of Primary Air/Coal Path Components (Minimum Four (4) Years):	Nozzles: 6-8 yrs.+ Fuel Dist. 4-6 yrs.+

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resulted in a significant improvement. The RMS value was reduced to 13% of the mean - an improvement of 4.62 over the baseline. Existing elbow-based fuel injectors that contain conical diffusers suffer from fuel imbalances of 36% RMS. In this case, the Opti-Flow™ system yields a 3 to 1 improvement in fuel distribution.

Severe fuel imbalance can result in the following problems:

- High-unburned carbon
- Long flames
- Flame instability problems.
- NO_x control problems

The significant improvement in fuel distribution provided by the Opti-Flow™ system will correct these problems to the extent that they are caused by fuel imbalance within the coal nozzles. Other fuel distributors cause coal "ropes" to impact on the coal nozzle and, thereby, reduce the nozzle's usable life. In the ABT design, all wear is limited to the wear-resistant devices in the elbow
The Opti-Flow™ system eliminates coal ropes and produces a nearly uniform fuel/air mix with axial flow downstream of the elbow. Therefore, the only erosion-prone areas will be located within the elbow. These areas will be lined with erosion-resistant materials and will be easily replaceable when necessary. A further advantage of this fuel distribution system is that, when used in conjunction with the Opti-Flow™ segmented nozzle, NO_x can be reduced compared to existing nozzles used for tangential firing.

The Opti-Flow™ Fuel Distribution System consists of:

1. The existing coal elbow with ABT's distributor vane package installed to break the coal rope formed in the fuel piping. All surfaces, including the leading edges are protected with ceramic tile.

2. A ceramic device at the coal elbow inlet will be used in conjunction with distributor vanes for equalizing coal flow to the tip.

7.3 IMPLICATION FOR FIELD RESULTS

Within a flame of a low NO_x burner, poor fuel distribution around the nozzle's circumference results in degraded emissions and efficiency performance. Optimal combustion - minimum NO_x and minimum unburned carbon, simultaneously - occurs when the circumferential fuel distribution is uniform (assuming primary air and secondary air distribution are also uniform). When this condition exists, the environment surrounding all fuel particles is the same and, therefore, results in uniform combustion conditions.

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Delete: "In the event the burner supplier does not provide for the installation—— penalty clause applies:"

Change boxed clause to read: "For delivery of all burner —— components contract price". Delete last sentence.

Delete remainder of Section 2.

ABT anticipates shipments to the IPP job site will begin in early January, prior to installation contractor arrival on site. In case of early shipments, IPP would be responsible for off loading and storage of equipment.

6.4 PART C - DIVISION C3

Bidding Documents - Additional bid

1 b. There are no normally recommended or required spares. However, the plant may choose to have our fuel injector assembly (barrel & nozzle) on site in the event that a burner might be damaged by some external cause.

g. There are no environmental limitations to the coal burners

h. The coal burners will slave to the mills. There are no special modes of operation.

i. There are no special maintenance requirements. ABT suggests that, fly ash be cleaned from adjustable register components at the commencement of an outage if the boiler is to be water cleaned.

j. There are no required boiler modifications to accommodate the new burners.

6.5 DIVISION E1, GENERAL CONDITIONS

Article 5: Fabrication drawings and burner design calculations will not be supplied however will be available at the fabrication shop, or at our engineering office, for reference during visits by IPSC.
Drawings anticipated for delivery to IPSC include:

a.General Arrangement Drawings showing equipment arrangement.
b.Field Installation Drawings.
c.Instruction manuals for supplied equipment.

LIMITATIONS	
Component Description	**Material Limitation, °F**
Those shielded from furnace radiation, set back from furnace opening, and exposed to maximum windbox temperature, i.e., register sleeve dampers, register backplate, windbox coverplate, fuel injector barrel, elbow flatback and fuel distributors:	750

Explanatory Comment: The reason for stating that there are no environmental limitations to the coal burners is that the stainless steel castings and plate facing the fire, ASTM 297 Gr HE or 309 will not deteriorate at temperatures of at least 2000°F. ABT has never measured tip temperatures above 1600°F, in pre-NSPS furnaces that have input per plan levels as high as 2.3MBTu/hr/ft^2 and Furnace Exit Gas Temperatures or 2400°F and firing Eastern bituminous coals. These are a good deal higher than Intermountain and generate higher gas temperatures.

Consequently, ABT does not consider operation of its design in IPSC's boiler to have any environmental limitations: The conditions are such that no material will operate anywhere near its limit. In fact, ABT has placed no such limitations on any retrofit ABT has done.

h. Available and recommended modes of operation for both the flame detection system and the burner system.

ABT will not require any special modes of operation in that the existing burner controls should not require changes. Burners will be setup during optimization (at 100 percent MCR) which will begin with components at predetermined positions similar to the follow example:

PREDETERMINED POSITIONS	
Burner Secondary Air Sleeve Dampers (SAD):	80 Percent Open
Burner Outer Air Registers Spin Vanes:	40 Percent Open
Burner Inner Air Sleeve Damper:	20 Percent Open

Following start-up these components are used to control the shape and ignition point of the flame, which in turn controls NOx, O2 distribution and CO emissions. The final settings are tabulated and provided to the customer for future

Additional Clarification to Spec. 45606

6.4 **Part C-Division 3**

1g. Bid form, Spec Page C-2, submitted with our proposal listed the max. and min. limitations of our offered equipment as being 2000^0 F and 140^0 F for the "Burner Tip" and "Scanner Electronic", respectively. Our design for specific components is based on their expected temperature exposure with the following limitations:

Component Description	Material Limitation, ^{0}F
Those exposed to direct furnace radiation, i.e. flow divider, spin vanes, throat casting, register front cone, fuel injector tip and flame stabilizers.	2000
Those semi-shielded from furnace radiation i.e. fixed vane spinner and inner zone damper perforated plate.	1600
Those shielded from furnace radiation, set back from furnace opening, and exposed to maximum windbox temperature, i.e. register sleeve dampers, register backplate, windbox coverplate, fuel injector barrel, elbow flatback and fuel distributors.	750

Explanatory Comment: The reason we stated that there are no environmental limitations to the coal burners is that the stainless steel castings and plate facing the fire, ASTM 297 Gr HE or 309 will not deteriorate at temperatures of at least 2000 F. We have never measured tip temperatures above 1600 F, in pre-NSPS furnaces that have input per plan levels as high as 2.3MBtu/hr/ ft^2 and Furnace Exit Gas Temperatures or 2400F and firing Eastern bituminous coals. These are a good deal higher than Intermountain and generate higher gas temperatures.

Consequently, we do not consider that operation of our design in your boiler to have any environmental limitations: the conditions are such that no material will operate anywhere near its limit. In fact we have placed no such limitations on any retrofit we have done.

1h. We will not require any special modes of operation in that the existing burner controls should not require changes. Burners will be setup during optimization (at 100% MCR) which will begin with components at predetermined positions similar to the following example:

Burner Secondary Air Sleeve Dampers (SAD)	80% Open
Burner Outer Air Registers Spin Vanes	40% Open
Burner Inner Air Sleeve Damper	20% Open

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3.0 Scope of Supply

Following is the scope of supply offered by ABT for the project.

3.1 Opti-Flow™ Low NO_x Burners

Forty-eight (48) Opti-Flow™ low NO_x burner modules with the following features.

- ABT's fuel distribution system consisting of silicon carbide and ceramic tile-lined components that will be installed in the existing ceramic tile-lined sweep elbow.
- A straight fuel injector with a cast HE tip for thermal resistance and long life.
- An inner air zone with a manually operated sliding damper for inner versus outer air flow distribution control and a stationary fixed vane spinner.
- A manually operated sleeve damper for total burner secondary air flow control and burner air flow balancing.
- Manually operated outer zone, axial spin vanes.
- Materials will be ASTM297 grade HE castings, 309 SS (in high heat affected areas), 304 SS, and carbon steel where appropriate.
- Burner front windbox cover plate.
- New windbox/burner adapter ring.
  Note: ABT has found that some windbox front plates can be warped, resulting in a variation in distance between the windbox plate and the waterwall throat. To provide an easier installation, ABT is providing a seal ring that will slide into the existing windbox opening and allow easier fit-up by compensating for windbox to waterwall variations. The seal ring would be field welded to the windbox (the register front plate comes from the factory bolted to the seal ring.)
- Two thermocouples, each with terminal connection head mounted on burner front plate, for plants use in remote monitoring of burner tip and barrel temperatures.
- Plug-in design requiring no modifications to the windbox, waterwalls or existing burner support rails.
- Burner seal ring to attach to the existing burner throat seal plate.
- All gaskets, nuts, bolts and washers required for field assembly.
- Burner flame view port with purge air connection and ball valve assembly.

3.2 Flame Scanner Systems

ABT offers a replacement flame scanner system, including scanners, amplifiers and connection cables. The base scope includes supply of an IRIS system. Option for supply of an ABB system is also offered that, if selected, would result in a price adder of the amount listed in proposal Section 5.

PART C - DIVISION C3

BIDDING DOCUMENTS - ADDITIONAL BID INFORMATION

1. Bid Submittal Requirements: Information supplied in submittals shall include, but not be limited to, the following:

   a. Schedule showing the cost of replacement parts for both the burner components and the flame detection system, including a pricing index for calculating cost of individual replacement parts through the year 2010.

   b. A recommended spare parts list with current pricing and normal delivery schedule.

   c. Location, name, and telephone number of the nearest service technicians for both burners, burner instrumentation, and the flame detection systems.

   d. Analysis of fail-safe modes of operation of the flame detection system, including component self-diagnostics and alarming.

   e. Dimensional drawings as required for bid analysis and evaluation.

   f. Burner and lighter materials of construction and applicable temperature tolerance.

   g. Environmental limitations of burner and scanner hardware, including both airborne contaminants and heat.

   The Proposal form in Part C, Division C2, Bidding Documents - Proposal Schedule, that was submitted with Proposal, listed the maximum and minimum limitations of offered equipment as being 2000°F and 140°F for the "Burner Tip" and "Scanner Electronic", respectively. The design for specific components is based on expected temperature exposure with the following limitations:

LIMITATIONS	
Component Description	**Material Limitation, °F**
Those exposed to direct furnace radiation, i.e., flow divider, spin vanes, throat casting, register front cone, fuel injector tip and flame stabilizers:	2000
Those semi-shielded from furnace radiation, i.e., fixed vane spinner and inner zone damper perforated plate:	1600

4.0 Guarantees and Warranties

4.1 Workmanship and Quality:

ABT shall warrant the workmanship and quality of the supplied parts from the start-up date for a period of 12 months and 48 months for coal nozzle tips. ABT will supply a replacement for any supplied part which suffers a catastrophic failure due to design or workmanship flaws. IPSC will provide complete access to any supplied part that fails, including removal of any equipment that prevents access to the part to be replaced or repaired and removal and reinstallation of any complete ABT-supplied assemblies that cannot be repaired in-situ.

Changes to the appearance and dimensions of any part will be considered failures only if guaranteed emissions are affected to the extent that the unit is out of compliance and readjustment of burner operating parameters fails to return the emission to within guarantee level; and there are no changes to other equipment, operating methods, or fuel supply which could result in changes to the emissions.

The following requirements apply to both the material warranty and the below listed guarantees:

- Primary air flows shall be within ± 5% of the mill manufacturer's design primary air flow vs. coal flow curve
- Mills will not be operated at full load with more than one burner out of service.

4.2 Reliability

The Opti-Flow™ fuel injector components will prevent coal layout and dropout as well as the potential resultant coking inside the fuel injector during normal start-up and operation. Failures caused by other equipment are excluded, for example: mill and control system problems, igniters, or failed/stuck burner shut-off valves.

4.3 Pressure Drop

4.3.1 Fuel Injector

The pressure drop across the new fuel injector, as measured between the inlet flange and the furnace, at the respective elevation, will be no greater than with the existing burner. The new fuel injectors will not limit boiler load.

4.3.2 Secondary Air

Windbox pressure will not exceed 2" W.C., with overfire air ports (to be supplied by others) open

5.0 Pricing & Schedule

5.1 Pricing: Pricing for base scope is provided on bid form "Bid Pricing Sheet".

5.1.1 Option: Adder to Supply ABB Flame Scanners per Section 3.2...**$ 55,385.00**

All prices include freight, FOB Delta, Utah.
Pricing quoted is subject to acceptance within 120 days of date of quotation.

5.2 Payment Schedule

20% - Invoice Upon Award
20% - Upon submittal of burner general arrangement drawings.
20% - Upon commencement of burner fabrication
30% - Upon receipt of the equipment at the job site in good condition *
10% - Upon successful start-up**

Payment Terms - Net 30 days from date of ABT invoice. Payments made later than 30 after date of invoice will incur 1.5% per month interest charge.

* Early material shipment to be acceptable, with equipment storage by IPSC. The 30% payment upon receipt of equipment shall be prorated based on percent of major material items delivered.

** Retention applies to Low NO_x equipment supply only. Installation and sub-supplier equipment and services are excluded from retention.

5.3 Delivery Schedule

The following schedule is based upon an award date of September 5, 2003.

a)	Award -	9/5/03
b)	Burner Drawings for Review and Initial Procurement -	11/03/03
c)	Commence Fabrication	12/01/03
d)	Commence Equipment Shipment	01/09/04
e)	Complete Equipment Shipment	02/13/04
f)	Commence Outage (see Appendix 4 for installation schedule)	02/28/04
g)	Start-up	3/24/04
h)	Optimization Complete	4/07/04
i)	Guarantee Testing Complete	4/13/04

5.4 Recommended Spare Parts

ABT does not recommend any spares associated with the fuel injector or burner register assemblies as there is low risk of failure and our customers have not seen the need for stocking any of the associated parts. The longest lead parts are castings, for which we maintain the patterns, that can be supplied within 1- 2 weeks.

Reference Appendix A-2 of this proposal for Flame Scanner System recommended spares lists.

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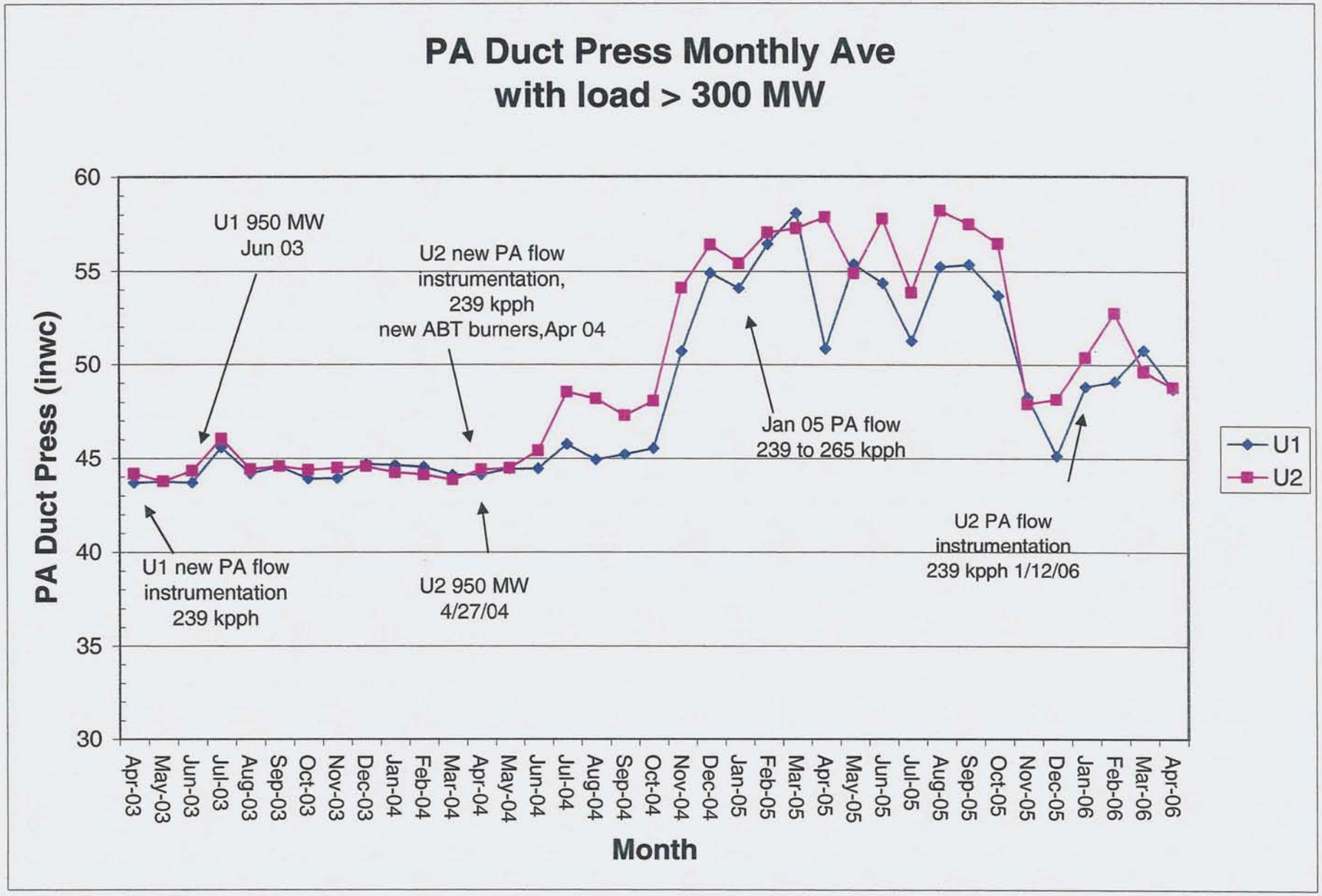
PA Duct Press Monthly Ave
with load > 300 MW
PA Duct Press (inwc)
60
55
50
45
40
35
30
U1 950 MW
Jun 03
U2 new PA flow
instrumentation,
239 kpph
new ABT burners,Apr 04
Jan 05 PA flow
239 to 265 kpph
U1 new PA flow
instrumentation
239 kpph
U2 950 MW
4/27/04
U2 PA flow
instrumentation
239 kpph 1/12/06
U1
U2
Apr-03
May-03
Jun-03
Jul-03
Aug-03
Sep-03
Oct-03
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Month

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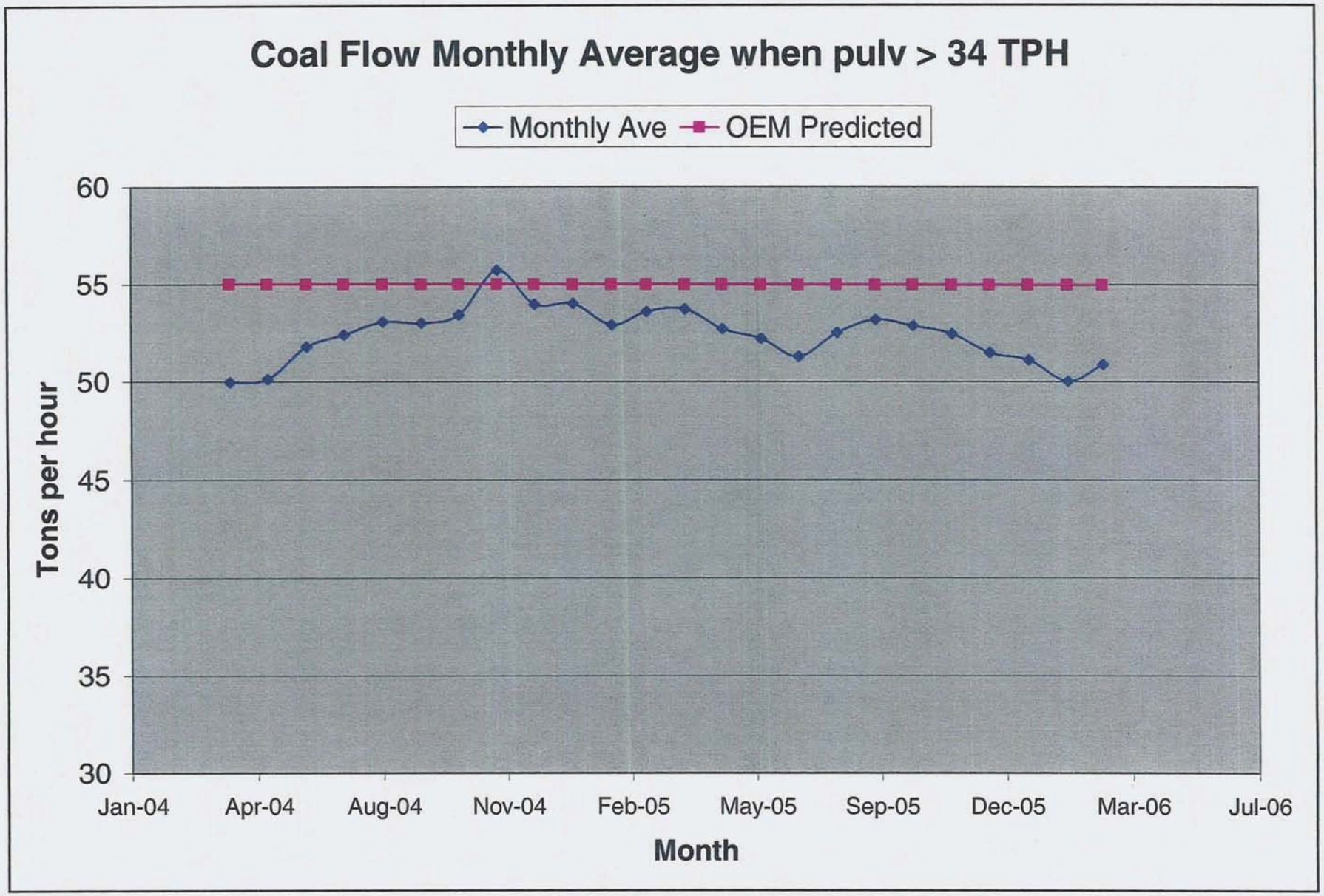

Coal Flow Monthly Average when pulv > 34 TPH
Monthly Ave
OEM Predicted
60
55
50
45
40
35
30
Tons per hour
Jan-04
Apr-04
Aug-04
Nov-04
Feb-05
May-05
Sep-05
Dec-05
Mar-06
Jul-06
Month

coal flow average when > 34 tph

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv	average
Apr-04	49.93	49.98	51.40	49.53	49.83	48.25	50.92	50.06	49.99
May-04	49.75	50.57	51.36	49.69	48.80	48.08	53.21	49.68	50.14
Jun-04	51.77	52.66	53.07	52.83	49.80	44.89	57.09	52.26	51.80
Jul-04	53.60	54.00	51.07	54.30	51.11	51.19	51.19	52.79	52.41
Aug-04	52.63	54.41	51.51	53.59	53.70	52.07	54.01	52.57	53.06
Sep-04	53.05	48.61	54.98	54.29	54.44	52.66	52.94	53.10	53.01
Oct-04	52.82	54.26	55.83	54.10	54.07	50.72	53.80	51.80	53.43
Nov-04		54.25	59.22	56.72	53.93	53.27	56.16	56.39	55.71
Dec-04	52.71	53.82	57.67	55.12	52.13	50.29	55.10	54.88	53.96
Jan-05	54.10	54.52	57.02	54.48	52.96	52.76	52.66	53.68	54.02
Feb-05	53.22	52.91	54.29	53.62	51.82	52.36	52.58	52.43	52.90
Mar-05	54.00	53.46	57.96	51.62	51.41	52.23	54.55	53.60	53.60
Apr-05	54.53	54.53		54.50	50.25	53.24	54.92	54.16	53.73
May-05	52.97	52.65	55.63	52.75	49.84	52.23	53.11	52.52	52.71
Jun-05	53.02	51.47	55.12	52.67	48.22	52.67		52.37	52.22
Jul-05	52.14	50.84	53.87	51.71	49.91	49.35		51.35	51.31
Aug-05	54.17	53.30	54.07	53.46	48.83	50.42		53.41	52.52
Sep-05	54.74	53.66	54.46	54.48	50.05	50.84		54.09	53.19
Oct-05	53.60	53.68	54.18	53.70	51.34	49.40	53.53	53.58	52.88
Nov-05	53.98	54.01	53.93		52.68	45.53	53.86	53.27	52.47
Dec-05	52.97	52.98	52.98	51.70	50.90	45.12	53.14	52.32	51.51
Jan-06	51.38	52.41	52.45	52.10	49.66	46.58	52.65	51.88	51.14
Feb-06	52.80	53.12	53.06	52.20	49.32	45.92	53.25	40.83	50.06
Mar-06	52.33	51.97	51.97	51.70	50.63	45.39	52.06	51.30	50.92

ABT Burner Contract

Spec 45605 pg C2-1

Maximum Wear Life of Primary Air/Coal Path Components (Minimum Four (4) Years):	Nozzles: 6-8 yrs Fuel Dist. 4-6 yrs

pg C3-1

Those exposed to direct furnace radiation, i.e., flow divider, spin vanes, throat castings, register front cone, fuel injector tip and flame stabilizers:	Material Limitation 2000 F

ABT Proposal Q03013

Section 4.1

ABT shall warrant the workmanship and quality of the supplied parts from start-up date for a period of 12 months and 48 months for coal nozzle tips.

Section 4.9

... the fuel injector will be sized to follow the mills' primary air flow characteristic. Consequently, ABT will design the burners for full load primary air flow, per mill, as per the OEM mill curves, with one mill out of service at boiler full load.

Section 5.4

ABT does not recommend any spares associated with the injector or burner register assemblies as there is low risk of failure and our customers have not seen the need for stocking any of the associated parts. The longest lead parts are castings, for which we maintain the patterns, that can be supplied within 1-2 weeks.

Section 6.4

The reason we stated that there is no environmental limitations to the coal burners is the stainless steel castings and plate facing the fire, ASTM 297 Gr HE or 309 will not deteriorate at temperatures of at least 2000 F.

Consequently, we do not consider that operation of our design in your boiler to have any environmental limitations: the conditions are such that no material will operate anywhere near its limit. In fact, we have placed no limitations on any retrofit we have done.

Section 7.2

In the ABT design, all wear is limited to the wear-resistant devices in the elbow. The Opti-Flow system eliminates coal ropes and produces a nearly uniform fuel/air mix with axial flow downstream of the elbow.

Spec 45606
pg F2-2

5f. The burner assemblies shall be fabricated of quality material sufficient to withstand the significant thermal stresses occurring within the windbox as a result of both radiant and convective heating. Any deformation causing malfunction of register assemblies or misdirection of flow through the burner within the guaranteed operability shall be repaired at the earliest possible opportunity and charged to the Contractor.

5g. Experience-based and verified wear-life shall be quoted within the bid for all burner components. No component shall last less than four (4) years before requiring rebuild, restoration, or replacement.

5p. Burners shall be capable of stable operation continuously from 45 percent to 115 percent of rated BTU output of the burner without supplemental fuels.

Spec. 45618
Division D2
pg D2-2

5f. No component, nor installation material, nor installation services shall last less than four (4) years before requiring rebuild, restoration, or replacement.

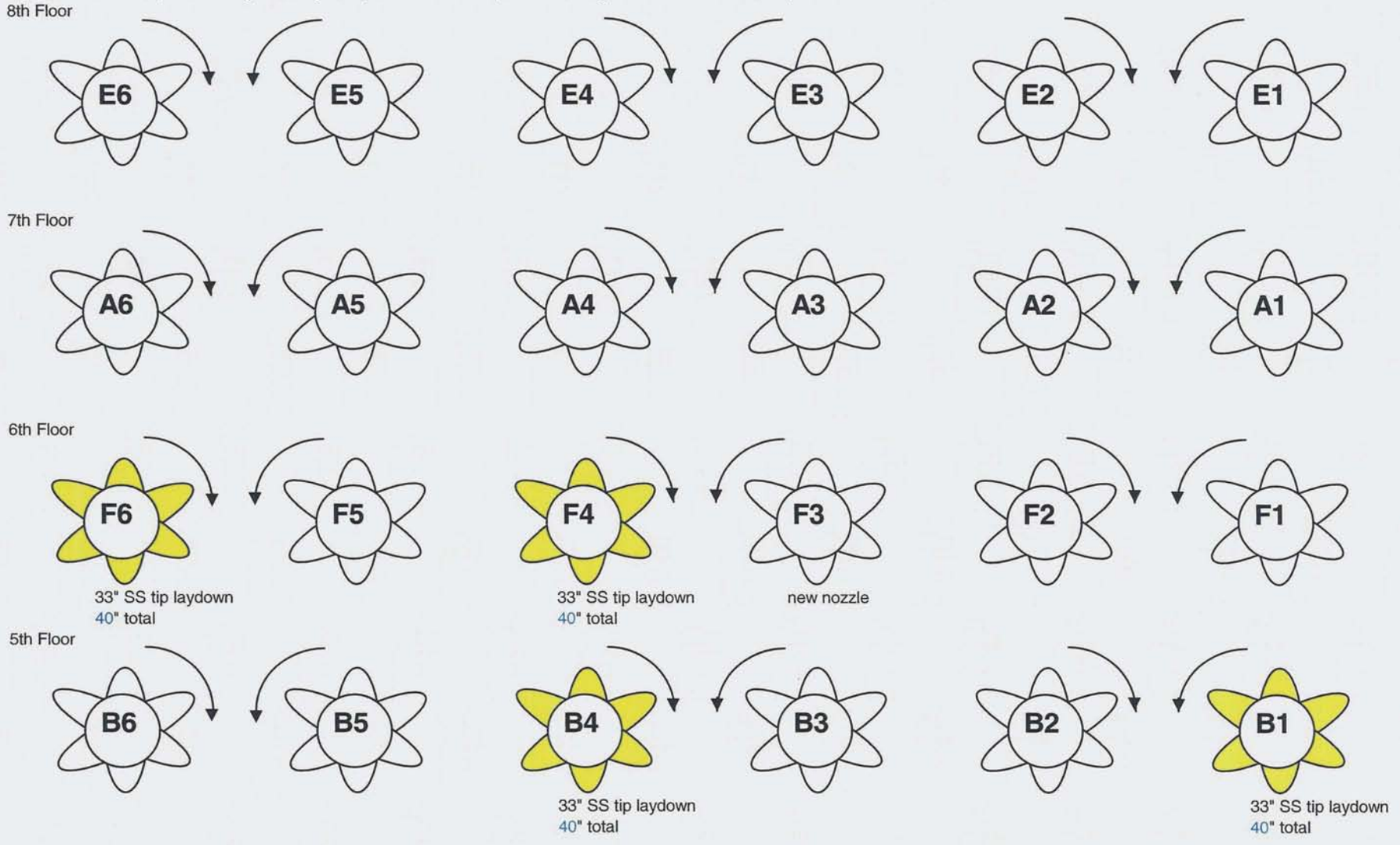
ABT Proposal

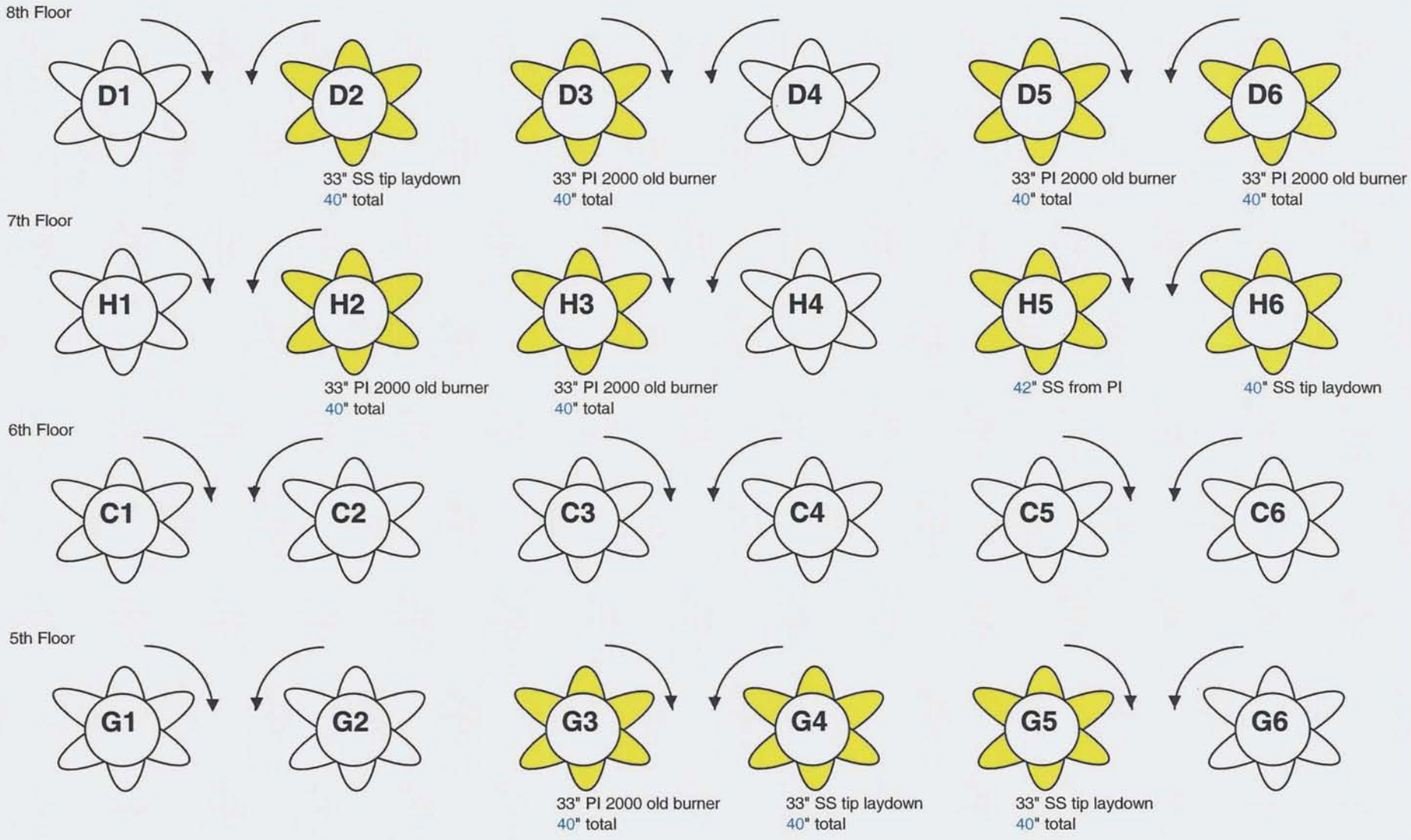
Introduction
Section 1.3, 2.2 pg 5
ABT utilizes high quality stainless steels for all parts of the fuel injector that face the furnace, as well as stainless steel castings for all complex parts. The result is high reliability and excellent longevity of the burners.

2.2 The segmented coal nozzle has an open design with no obstructions to wear or to collect coal.

2.2 pg 5 ABT has sized the fuel injector proposed here based on the PA flow contained in the OEM mill curves for Intermountain Unit 2.

Tips removed and replaced designated in yellow, all others were repaired with segment wear liners on all 6 pedals.

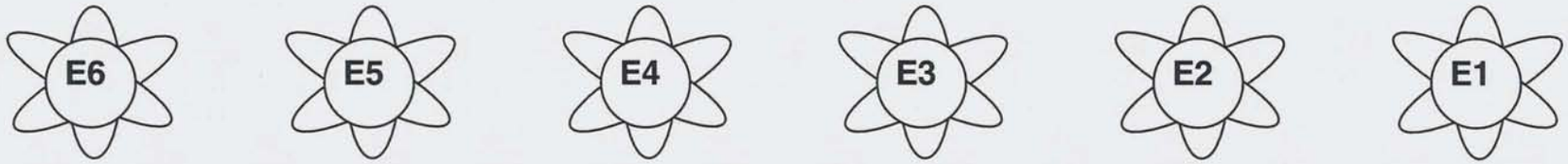



8th Floor
D1
D2
33" SS tip laydown
40" total
D3
33" PI 2000 old burner
40" total
D4
D5
33" PI 2000 old burner
40" total
D6
33" PI 2000 old burner
40" total
7th Floor
H1
H2
33" PI 2000 old burner
40" total
H3
33" PI 2000 old burner
40" total
H4
H5
42" SS from PI
H6
40" SS tip laydown
6th Floor
C1
C2
C3
C4
C5
C6
5th Floor
G1
G2
G3
33" PI 2000 old burner
40" total
G4
33" SS tip laydown
40" total
G5
33" SS tip laydown
40" total
G6
East
Rear Wall Looking South (Tips to have air sleeve moved back) Tip to be replaced
West

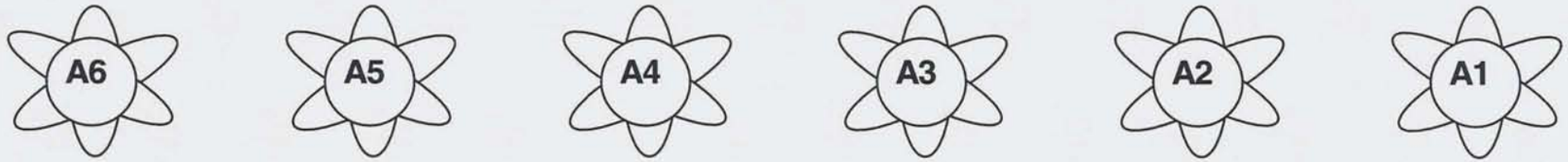
IP7021387

Tips removed and replaced designated in yellow, all others were repaired with segment wear liners on all 6 pedals.

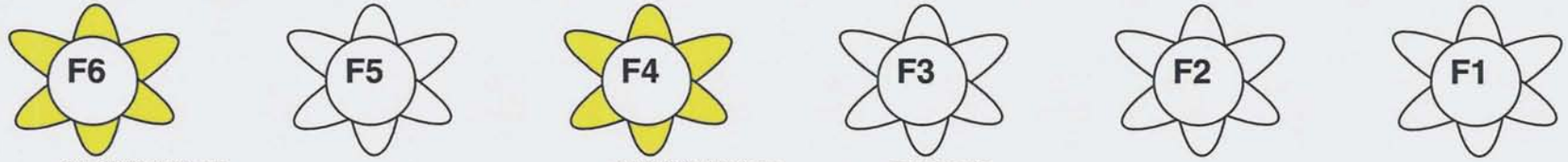
8th Floor



7th Floor



6th Floor

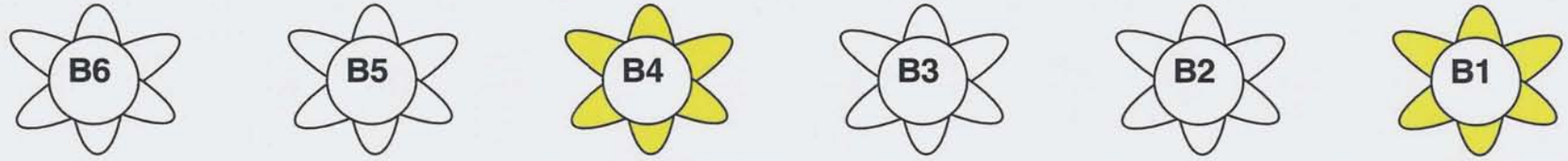


33" SS tip laydown
40" total

33" SS tip laydown
40" total

new nozzle

5th Floor



33" SS tip laydown
40" total

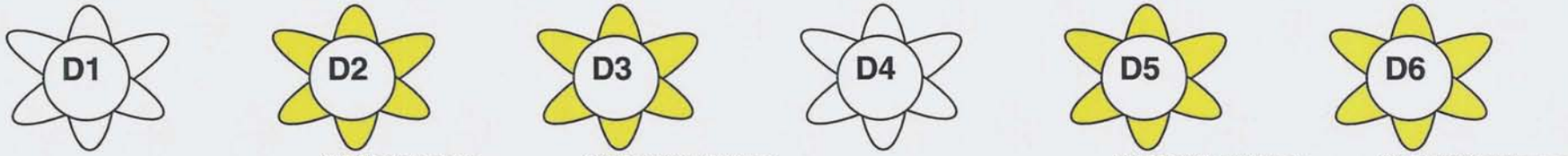
33" SS tip laydown
40" total

West

Front wall looking North (Tips to have air sleeve moved back.) Tip to be replaced

East

8th Floor



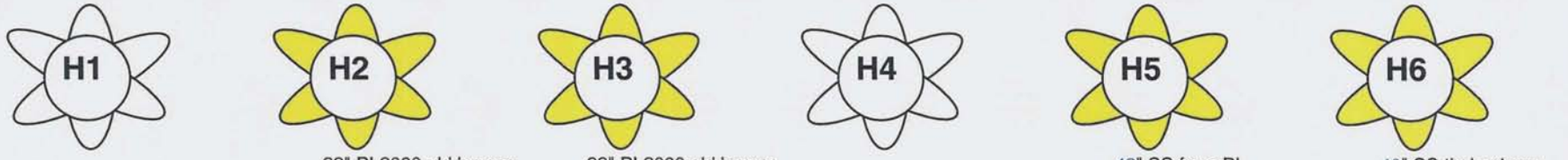
33" SS tip laydown
40" total

33" PI 2000 old burner
40" total

33" PI 2000 old burner
40" total

33" PI 2000 old burner
40" total

7th Floor



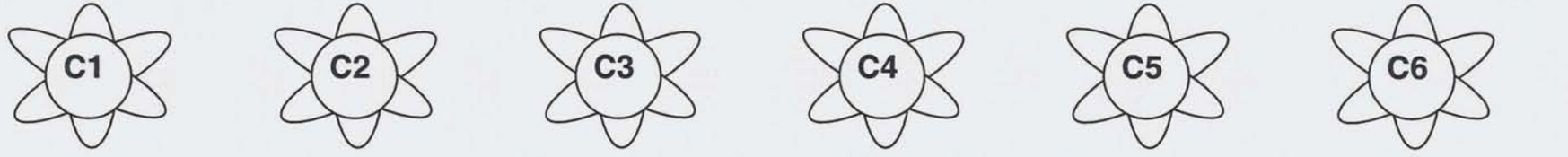
33" PI 2000 old burner
40" total

33" PI 2000 old burner
40" total

42" SS from PI

40" SS tip laydown

6th Floor



5th Floor

33" PI 2000 old burner
40" total

33" SS tip laydown
40" total

33" SS tip laydown
40" total

East

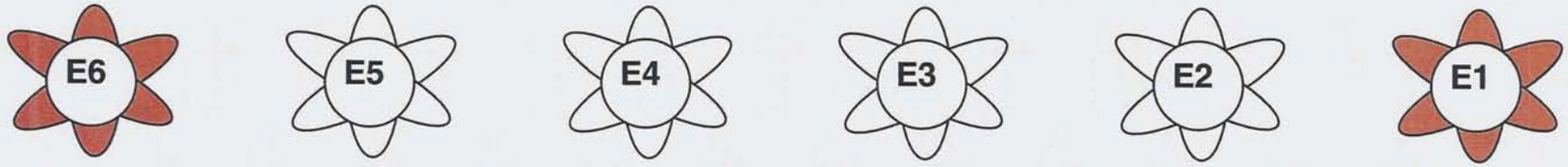
Rear Wall Looking South (Tips to have air sleeve moved back) Tip to be replaced

West

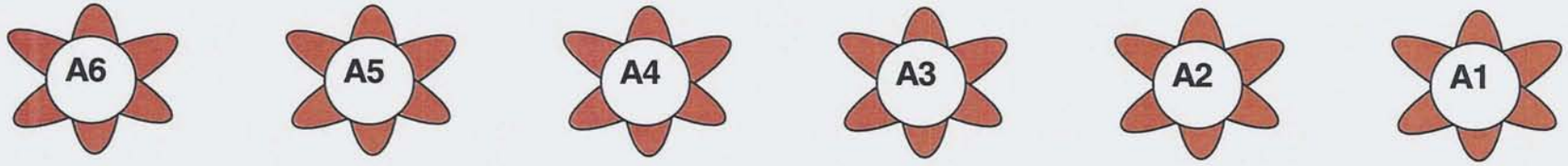
IP7021389

nozzles designated to pull for repairs 1st walk through. It was decided to pull and do all nozzles.

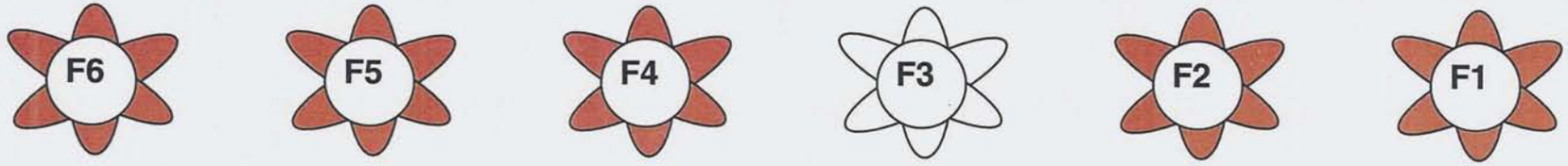
8th Floor



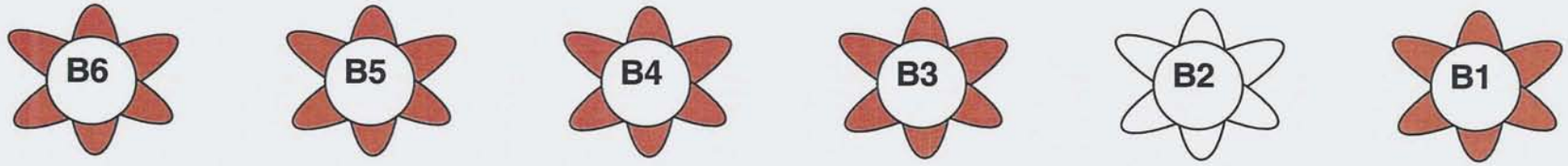
7th Floor



6th Floor



5th Floor



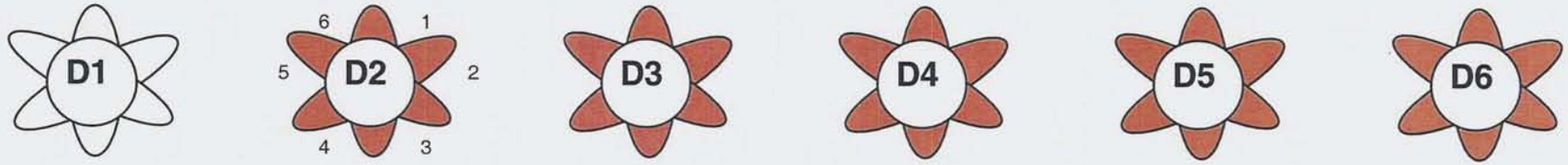
West

Front wall looking North

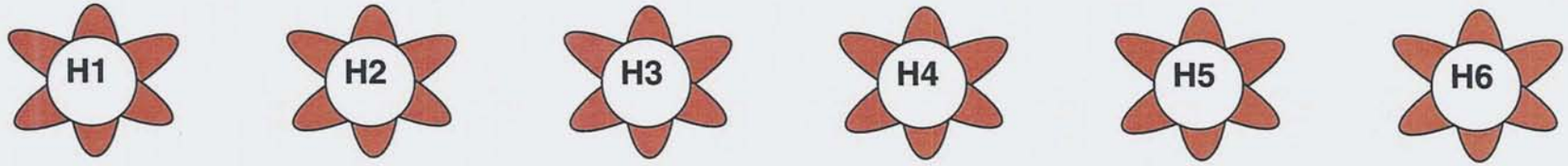
East

IP7021390

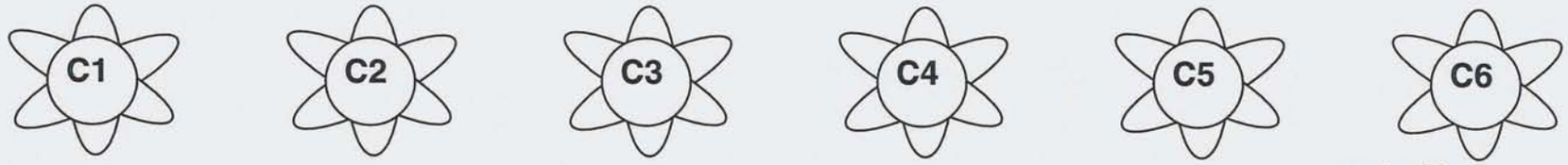
8th Floor



7th Floor

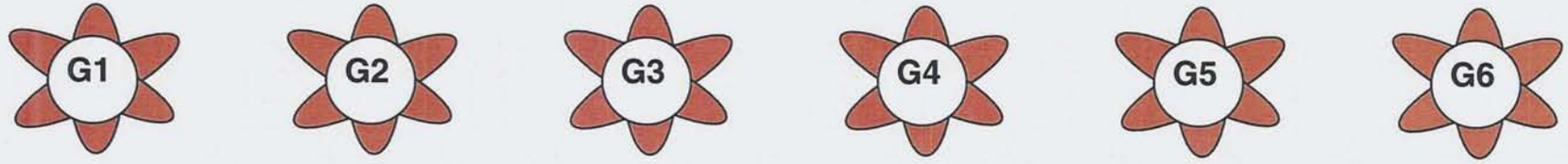


6th Floor



worst on this row

5th Floor



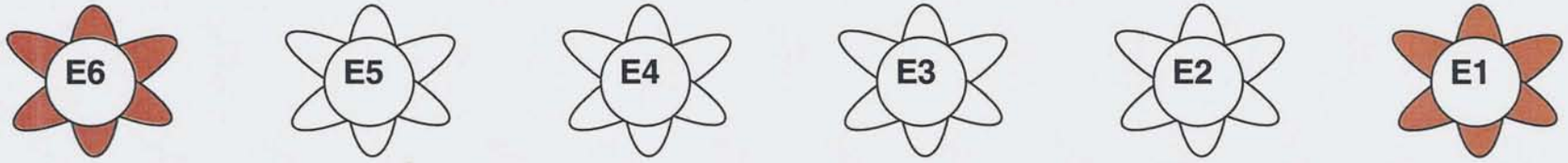
East

Rear Wall Looking South

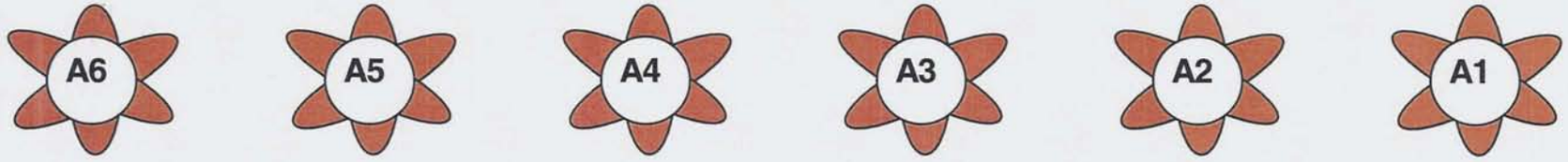
West

IP7021391

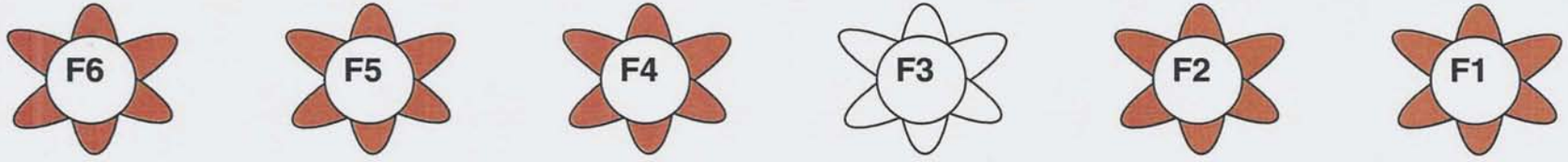
8th Floor



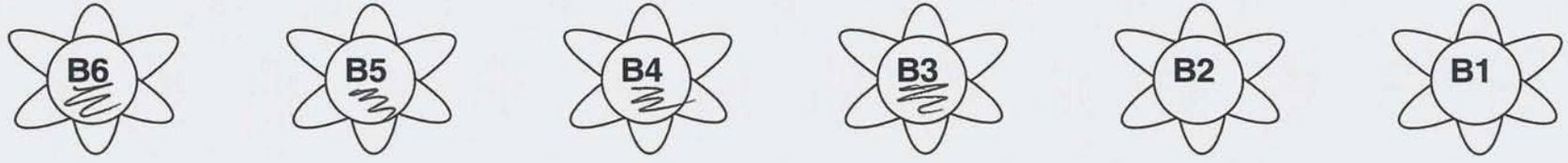
7th Floor



6th Floor



5th Floor



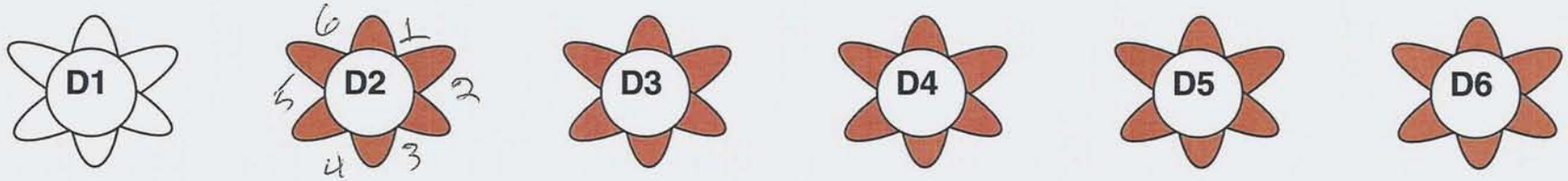
West

Front wall looking North

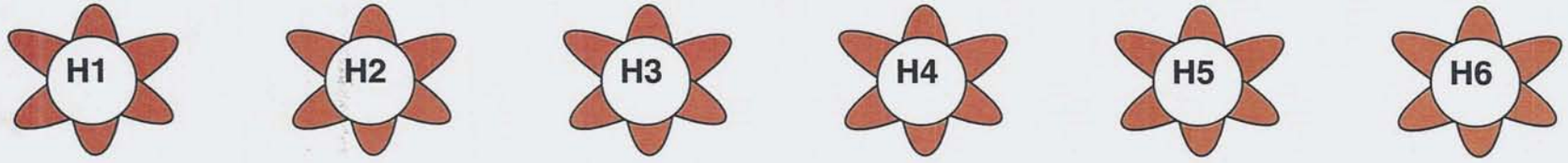
East

IP70213921

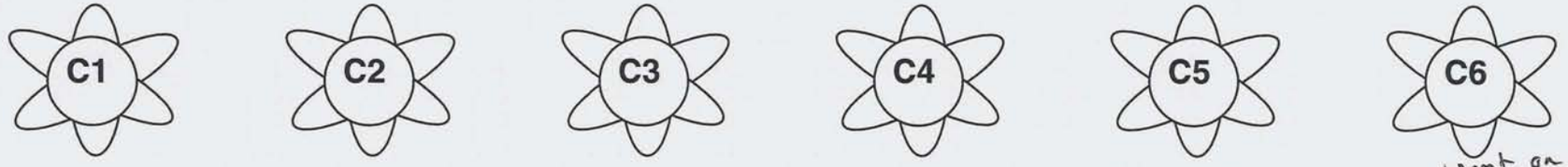
8th Floor



7th Floor

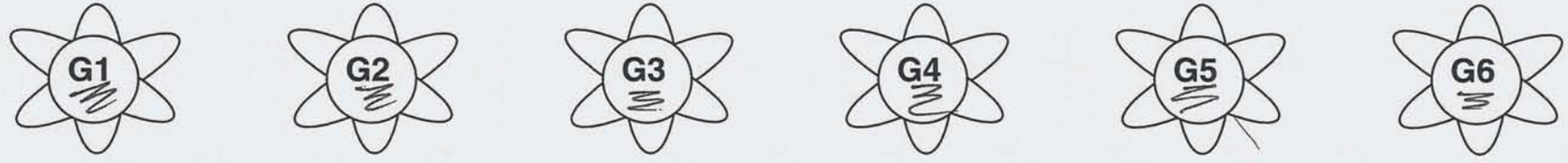


6th Floor



Worst on this row

5th Floor



East

Rear Wall Looking South

West

IP7021393

Hours off-line using 15 min average TPH < 2.0

summary	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv	period hrs	hrs offline	shutdowns
Apr-04	160.5	177.75	181.5	175.25	371.25	195.75	140.25	208.5	719	138.25	1
May-04	54	30.75	271.25	151.75	36.5	91.25	28.5	100.25	744	14.80	1
Jun-04	334.5	0	394	0.5	28.25	0.75	4.25	0	720	0.00	0
Jul-04	0	27	221	0	318.5	0.75	190.5	0	744	0.00	0
Aug-04	19	278	26.5	0	358	0	4.5	46.25	744	0.00	0
Sep-04	0	694.75	0	0	1	30.5	0	22.5	720	0.00	0
Oct-04	598	30.25	0	0	6.25	90.75	5.5	1.75	745	0.00	0
Nov-04	720	1.5	3.5	40.75	0.5	6.25	16	0.5	720	0.00	0
Dec-04	550.75	0	0	0	0	36.25	0	0	744	0.00	0
Jan-05	72.5	26.5	52.5	37	40.5	32.75	36.75	645.25	744	29.42	1
Feb-05	188.5	173.75	304.75	416.25	186.75	191.25	168.25	252.25	672	173.80	1
Mar-05	0.25	36.75	652.75	242.75	1.75	8.75	39.75	1	744	0.00	0
Apr-05	0.5	0	719	0	0	0.5	0	0	719	0.00	0
May-05	123.25	64	213	190.5	61.25	199.25	82.75	178	744	51.73	1
Jun-05	0	0	0	1.5	0	3.75	720	0	720	0.00	0
Jul-05	28.75	18.75	22.75	36	29	28	744	27.25	744	23.55	2
Aug-05	142.5	127.5	133.75	141.25	144.5	137	744	138.75	744	133.88	2
Sep-05	2	0.25	0.75	0.25	1.75	2.75	720	0	720	0.00	0
Oct-05	99.25	84.25	83.75	164.25	250.75	52.5	187.25	47	745	36.31	2
Nov-05	50.75	43.75	49.75	720	52.5	49.25	45.25	50	720	46.60	1
Dec-05	7.75	7.75	0	192.5	0	478.75	0	0	744	0.00	0
Jan-06	20.5	19.75	36.75	21	33	573.75	5.25	0	744	0.00	0
Feb-06	5.5	0	0	1.75	35.75	1	0.5	671.25	672	0.00	0
Mar-06	78.5	312	62	101.25	465.75	66.75	57.5	67.5	744	59.98	3
hrs sum	3257.25	2155	3429.25	2634.5	2423.5	2278.25	3940.75	2458	17520	708.32	15
	2548.93	1446.68	2720.93	1926.18	1715.18	1569.93	3232.43	1749.68			

off most

G
C
A
D
H
E
F

off least

B

Hours off-line using 15 min average TPH < 2.0

summary	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv	period hrs	hrs offline	shutdowns
Apr-04	160.5	177.75	181.5	175.25	371.25	195.75	140.25	208.5	719	138.25	1
May-04	54	30.75	271.25	151.75	36.5	91.25	28.5	100.25	744	14.80	1
Jun-04	334.5	0	394	0.5	28.25	0.75	4.25	0	720	0.00	0
Jul-04	0	27	221	0	318.5	0.75	190.5	0	744	0.00	0
Aug-04	19	278	26.5	0	358	0	4.5	46.25	744	0.00	0
Sep-04	0	694.75	0	0	1	30.5	0	22.5	720	0.00	0
Oct-04	598	30.25	0	0	6.25	90.75	5.5	1.75	745	0.00	0
Nov-04	720	1.5	3.5	40.75	0.5	6.25	16	0.5	720	0.00	0
Dec-04	550.75	0	0	0	0	36.25	0	0	744	0.00	0
Jan-05	72.5	26.5	52.5	37	40.5	32.75	36.75	645.25	744	29.42	1
Feb-05	188.5	173.75	304.75	416.25	186.75	191.25	168.25	252.25	672	173.80	1
Mar-05	0.25	36.75	652.75	242.75	1.75	8.75	39.75	1	744	0.00	0
Apr-05	0.5	0	719	0	0	0.5	0	0	719	0.00	0
May-05	123.25	64	213	190.5	61.25	199.25	82.75	178	744	51.73	1
Jun-05	0	0	0	1.5	0	3.75	720	0	720	0.00	0
Jul-05	28.75	18.75	22.75	36	29	28	744	27.25	744	23.55	2
Aug-05	142.5	127.5	133.75	141.25	144.5	137	744	138.75	744	133.88	2
Sep-05	2	0.25	0.75	0.25	1.75	2.75	720	0	720	0.00	0
Oct-05	99.25	84.25	83.75	164.25	250.75	52.5	187.25	47	745	36.31	2
Nov-05	50.75	43.75	49.75	720	52.5	49.25	45.25	50	720	46.60	1
Dec-05	7.75	7.75	0	192.5	0	478.75	0	0	744	0.00	0
Jan-06	20.5	19.75	36.75	21	33	573.75	5.25	0	744	0.00	0
Feb-06	5.5	0	0	1.75	35.75	1	0.5	671.25	672	0.00	0
Mar-06	78.5	312	62	101.25	465.75	66.75	57.5	67.5	744	59.98	3
hrs sum	3257.25	2155	3429.25	2634.5	2423.5	2278.25	3940.75	2458	17520	708.32	15

Jun 05

A —

B —

—

D — 2164 – 2169

E —

F 2342 – 2347 , 2664 - 2667, 2765 - 2769

G 6 – 2885 (720 hrs)

H —

Jul 05

A 2082 - 2100, 2886 – 2981

B 2082 - 2084, 2887 - 2958

C 2082 - 2088, 2887 - 2970

D 1105 – 1138, 2082 - 2092, 2883 - 2981

E 2082 - 2094, 2879 – 2981

F 2082 - 2086, 2328 - 2339, 2882 - 2976

G 6 – 2981 (744 hrs)

H 2082 - 2090, 2880 - 2979

Aug 05

A 46-296, 311-616, 2239-2241, 2251-2260,

B 49-276, 313-588, 868, 2219-2223,

49-289, 312-604, 863,

D 6, 45-299, 310-618,

E 6-8, 44-302, 310-620, 1573-1577,

F 48-293, 311-611, 1741,

G 6-2981 (2981-6+1)*.25 = 744 hrs

H 48-297, 311-615,

Sept 05

A 2063-2070,

B 2262,

C 747, 2589-2590,

D 2265,

E 682-683, 2290, 2367-2370

F 2389-2399,

G 6-2885

H —

Oct 05

A 778–809, 954–1147, 1345–1497, 1508–1522, 2171–2173,

B 1154–1486, 1508–1511

C 1346–1492, 1508–1521, 2311–2484

D 1339–1500, 1508–1527, 2507–2981

E 587, 589–631, 1340–1497, 1508–2308

[illegible] 1165, 1167–1177, 1348–1489, 1508–1519, 1588–1607, 2345, 2348–2350, 2485–2504

[illegible] 6–575, 633–672, 811–817, 820–824, 1350–1472, 1508–1511

[illegible] 1244–1531,

Nov 05

[illegible] 383–585,

[illegible] 390–564,

[illegible] 379–577

[illegible] 6–2885

[illegible] 380–589

[illegible] 385–388, 390–582

[illegible] 389–569,

[illegible] 386–527, 529–586

Dec 05

A 708 - 723, 1004 1008 - 1014, 1016 - 1022

B 731 - 741, 1032 - 1051,

C —

D 6 - 656, 794 - 912,

E —

F 1067 - 2981

G —

H —

Jan 06

A 2149 - 2220

B 2258 - 2315, 2841 - 2855, 2857 - 2862

C 912 - 971, 2319 - 2392, 2483 - 2495,

D 2397 - 2480

E 2502 - 2633,

F 6 - 2126, 2792 - 2965

G 2235 - 2255,

H —

Feb 06

A 313-321*, 1435*-1447,

B —

C —

D 313-319,

E 2551-2693*

F 313-316,

G 313-314,

H 9-2693*

Mar 06

A 303-368, 1704-1945, 2976-2981

B 303-315, 1704-1887, 1931-2981

C 303-358, 1704-1890, 2977-2981

D 303-372, 1704-2026, 2970-2981

E 6-1653, 1704-1909, 2973-2981

F 82-95, 303-364, 1704-1892, 2980-2981

G 303-356, 1704-1877, ~~2591-2602~~ no data on E+G, G still I/S, 2980-2981

H 303-367, 714, 1704-1901, 2976-2981

Apr 04

A 198-772, 2739-2805,

P 201-717, 1284-1393, 1572-1604, 2176-2226,

C 200-769, 1511-1533, 1761-1963, 1993-2044, 2565-2642,

D 197-778, 2088-2152, 2645-2698,

E 196-1286, 1289-1290, 1406-1509, 2229-2435, 2469-2510, 2699-2737,

F 6-766, 2513-2532, 2537-2538,

G 201-761,

H 199-770, 1536-1570, 1607-1759, 2808-2881

May 04

A 1271-1345, 1812-1847, 2069-2121, 2247-2296, 2533-2534,

B 284-332, 1279-1329, 1415-1422, 2229-2243,

C 1091-1342, 1424-1565, 1609-1666, 1804-1813, 1900-1948, 1975-2065, 2299-2332, 2387-2429, 2476-2526, 2580-2624, 2672-2981

D 333-469, 526-604, 776-779, 782-1088, 1276-1351, 1812-1815,

E 1269-1414,

F 472-524, 606-775, 1277-1339, 1812-1889, 1892,

G 222-282, 1280-1332,

H 6-220, 1268-1349, 2123-2226

Jun 04

A 286-290, 292, 337, 341-1260, 1288-1329, 1372-1521, 1524-1741, 1969

B —

C 6-396, 457-477, 1265-1286, 1744-2885

D 2824-2825,

E 2626-2630, 2778-2885

F 1547-1549,

G 684-685, 687-698, 2624-2626

H —

Jul 04

A —

B 232-258, 892-925, 1691-1700, 1969-1978, 2488, 2828-2853,

C 6-878, 2396-2401, 2832-2836

D —

E 6-21, 975-981, 1147-1158, 1743-2981

F 255-257,

G 928-1687, 1731-1732,

H —

Aug 04

A 1332 - 1407,

B 1870 - 2981

C 1244 - 1321, 1693 - 1720,

D —

E 6 - 1240, 1464-1465, 1488 - 1682,

F —

G 1515, 1517 - 1533,

H 1426 - 1461, 1515, 1723 - 1867, 2821 - 2823

Sept 04

A —

B 6 - 2755, 2757, 2819 - 2846

C —

D —

E 2269 - 2272,

F 1984 - 2101, 2262, 2266 - 2268

G —

H 2346 - 2375, 2378 - 2379, 2382 - 2383, 2387 - 2394, 2760 - 2770, 2849 - 2885

OCT 04

A 590 - 2981

B 437 - 557

C —

D —

E 135 - 159,

F 15-134, 161-182, 215-435

G 191 - 212,

H 6-12,

Nov 04

A 6 - 2885

B 601, 1065-1066, 2297-2298, 2505,

C 1931-1944,

D 588, 590, 616 - 660, 1254, 1487-1568, 1574-1575, 1929 - 1956, 2009-2010, 2507,

E 1264, 2510,

F 599, 625, 1169-1170, 1938-1946, 2512, 2595-2605,

G 614-630, 1571-1615, 1935, 2300,

H 620, 1257,

Dec 04

A 6 – 2207, 2210

B —

C —

D —

E —

F 2710 – 2854

G —

H —

Jan 05

A 222 - 266, 1058 - 1187 1203 - 1204, 1677 - 1693,

B 226, 307 386, 1057 - 1161,

C 383-384, 1054 - 1182, 1335 - 1407, 1580 - 1585,

D 305, 380-381 1051 - 1189, 1336, 1982 - 1986,

E 302-303, 375, 1052 - 1199, 1549-1548, 1982-1987,

F 311, 377-378, 1057 - 1178, 1751 - 1756,

G 1057 - 1164, 1812 - 1850,

H 313-315, 404 - 2981

Feb 05

A 297-321, 1063-1784, 1954-1960

B 1074-1766, 2530-2531

C 587-1778, 2509-2535

D 325-354, 1059-2693

E 1062-1809

F 1066-1789, 1865-1870, 1879-1907, 1944-1949

G 1068-1741

H 6-292, 294, 1064-1784

Mar 05

A 977

B 6-16, 979, 1757-1890, 2131

C 371-2981

D 6-975, 1178

E 985, 1911-1913, 2138, 2376-2377

F 416-420, 448-456, 497-500, 537-558, 1121

G 2425-2583

H 26-27, 1912, 2266

Apr 05

A 1230-1231,

R —

C 6 to 2881

D —

E —

F 1566-1567

G —

H —

May 05

A 2872 - 2752, 2810 - 2821

B 2874 - 2870, 2765 - 2803

C 6 to 474, 1629 - 1778, 2879 - 2882, 2825 - 2857

D 477 - 1021, 2271 - 2487,

E 1018 - 1035, 2266 - 2488, 2805 - 2808

F 1038 - 1636, 2268 - 2465,

G 2269 - 2477, 2860 - 2781

H 1732 - 2499,

maximum reading

	E1 int temp	E1 tip temp	E2 int temp	E2 tip temp	E3 int temp	E3 tip temp	E4 int temp	E4 tip temp	E5 int temp	E5 tip temp	E6 int temp	E6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	403.71	804.44	374.35	505.85	405.82	782.02	828.63	880.88	382.69	853.59	473.21	855.06
Nov-04	406.47	1037.93	437.18	912.02	424.12	1023.27	443.03	1130.98	432.89	1108.03	453.39	981.77
Dec-04	397.44	1047.41	396.82	997.22	432.69	1091.80	436.14	1161.07	428.29	1141.63	432.65	1023.17
Jan-05	734.26	1345.62	867.57	1660.00	798.40	1525.85	868.88	1660.00	805.08	1550.17	760.29	1471.83
Feb-05	713.97	1319.48	838.70	1660.00	808.05	1496.86	867.18	1660.00	831.23	1553.16	772.16	1488.81
Mar-05	533.95	1196.83	618.54	1511.74	587.85	1377.42	594.00	1441.11	580.19	1401.76	547.15	1317.48
Apr-05	351.65	832.20	397.94	436.76	397.62	802.32	347.52	761.90	330.30	887.06	354.58	846.67
May-05	904.54	1437.72	915.97	1660.00	966.27	1660.00	1070.21	1660.00	1038.85	1660.00	970.94	1660.00
Jun-05	371.95	992.24	840.35	1590.30	429.65	1006.58	418.56	886.59	383.39	1037.06	368.28	875.21
Jul-05	629.33	1219.22	772.27	1660.00	754.34	1420.49	781.81	1609.47	772.11	1472.96	718.80	1390.81
Aug-05	621.20	1203.57	702.24	1602.21	692.10	1387.16	712.38	1557.20	698.82	1442.67	658.07	1365.65
Sep-05	681.02	1539.40	777.51	1578.16	752.16	1418.53	763.09	1577.60	776.04	1463.09	726.50	1414.15
Oct-05	976.32	1660.00	1047.98	1660.00	952.50	1660.00	1052.44	1660.00	1056.98	1660.00	946.63	1536.89
Nov-05	586.68	1491.50	693.43	1592.33	687.05	1415.10	699.72	1559.60	672.66	1471.18	650.77	1409.57
Dec-05	773.03	582.57	374.60	411.94	419.81	923.21	395.08	760.11	389.52	945.98	347.02	835.62
Jan-06	931.30	0.00	1039.88	1660.00	941.40	1591.59	1013.03	1660.00	1022.45	1601.56	892.47	1495.27
Feb-06	937.45	212.04	1004.96	419.70	928.49	1588.28	1015.90	1660.00	1029.06	1660.00	923.58	1660.00
Mar-06	944.63	218.22	1040.69	219.99	1040.67	1660.00	1092.19	1660.00	1092.52	1660.00	949.82	1660.00

hours>1660 F

	E1 int temp	E1 tip temp	E2 int temp	E2 tip temp	E3 int temp	E3 tip temp	E4 int temp	E4 tip temp	E5 int temp	E5 tip temp	E6 int temp	E6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	2.75	0	0	0	2	0	0	0	0
Feb-05	0	0	0	3.75	0	0	0	3.25	0	0	0	0
Mar-05	0	0	0	0	0	0	0	0	0	0	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	0	0	2.75	0	2	0	3	0	2.25	0	1
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0.25	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	175	0	199.75	0	5.25	0	197.25	0	50	0	0
Nov-05	0	0	0	0	0	0	0	0	0	0	0	0
Dec-05	0	0	0	0	0	0	0	0	0	0	0	0
Jan-06	0	0	0	32.25	0	0	0	32.25	0	0	0	0
Feb-06	0	0	0	0	0	0	0	34.75	0	17.5	0	12.5
Mar-06	0	0	0	0	0	154.75	0	396.25	0	258.5	0	88.5
summation	0	175	0	241.5	0	162	0	668.75	0	328.25	0	102

maximum reading

	A1 int temp	A1 tip temp	A2 int temp	A2 tip temp	A3 int temp	A3 tip temp	A4 int temp	A4 tip temp	A5 int temp	A5 tip temp	A6 int temp	A6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	879.60	0.00	0.02	0.02
Nov-04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	879.60	0.00	0.02	0.02
Dec-04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.02	0.02
Jan-05	370.87	846.96	398.72	498.45	387.98	862.89	365.12	687.21	874.78	1503.45	785.10	1605.48
Feb-05	759.45	1292.90	835.22	1615.49	799.57	1408.62	911.59	1660.00	875.12	1458.64	802.37	1615.85
Mar-05	464.44	1120.63	524.51	1126.17	536.31	1221.20	525.49	1468.82	520.73	1276.94	544.31	1340.00
Apr-05	544.69	1166.70	605.71	1285.81	618.37	1340.36	572.27	1412.88	575.16	1323.97	579.92	1387.76
May-05	755.37	1305.37	844.49	1660.00	771.47	1454.34	840.18	1660.00	883.28	1512.32	844.22	1660.00
Jun-05	353.78	1108.03	384.57	502.72	455.71	883.45	840.18	666.99	366.76	861.54	399.66	518.20
Jul-05	723.65	1177.80	766.28	1465.14	724.83	1308.11	840.18	1597.63	772.48	1337.90	748.59	1481.09
Aug-05	772.97	1201.25	795.97	1508.86	777.71	1327.41	853.90	1660.00	864.96	1378.05	838.99	1545.08
Sep-05	778.50	1200.50	802.54	1513.04	777.77	1334.04	866.19	1660.00	845.67	1280.83	838.80	1522.12
Oct-05	1008.08	1358.75	955.95	1660.00	969.54	1528.98	953.49	457.13	924.61	1497.78	922.86	1660.00
Nov-05	516.02	1017.09	572.06	1215.25	556.11	1113.89	642.11	292.08	605.60	1389.49	586.43	1348.54
Dec-05	806.38	1311.47	856.87	1660.00	829.24	1457.44	931.34	292.08	871.81	1660.00	887.18	1660.00
Jan-06	902.79	1370.73	916.64	1660.00	946.10	1528.36	995.00	292.08	923.23	1660.00	923.13	1660.00
Feb-06	865.01	1614.67	893.89	1660.00	891.39	1421.07	930.91	292.08	867.33	1660.00	899.95	1660.00
Mar-06	711.99	134.27	794.62	1593.99	772.03	1480.55	814.09	182.51	796.43	1660.00	661.81	1408.03

hours>1660 F

	A1 int temp	A1 tip temp	A2 int temp	A2 tip temp	A3 int temp	A3 tip temp	A4 int temp	A4 tip temp	A5 int temp	A5 tip temp	A6 int temp	A6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	0	0	0	0	0	0	0
Feb-05	0	0	0	0	0	0	0	6.75	0	0	0	0
Mar-05	0	0	0	0	0	0	0	0	0	0	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	0	0	57.5	0	0	0	67.75	0	0	0	64.75
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	1	0	0	0	0
Sep-05	0	0	0	0	0	0	0	1	0	0	0	0
Oct-05	0	0	0	47	0	0	0	0	0	0	0	48.75
Nov-05	0	0	0	0	0	0	0	0	0	0	0	0
Dec-05	0	0	0	2.25	0	0	0	0	0	6.25	0	4.25
Jan-06	0	0	0	12	0	0	0	0	0	20	0	19.5
Feb-06	0	0	0	0.25	0	0	0	0	0	2.25	0	2.25
Mar-06	0	0	0	0	0	0	0	0	0	10.25	0	0
	0	0	0	119	0	0	0	76.5	0	38.75	0	139.5

maximum reading

	F1 int temp	F1 tip temp	F2 int temp	F2 tip temp	F3 int temp	F3 tip temp	F4 int temp	F4 tip temp	F5 int temp	F5 tip temp	F6 int temp	F6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	713.72	1279.32	1165.47	1430.47	764.29	1190.41	711.94	1411.07	1057.67	1264.40	701.16	1341.86
Nov-04	806.26	1250.37	862.45	1409.97	871.56	1235.77	874.01	1499.45	827.74	1280.67	854.70	1361.39
Dec-04	848.37	1339.40	916.30	1500.39	923.56	1362.05	967.32	1614.46	867.98	1418.74	912.96	1471.51
Jan-05	742.09	1285.80	738.79	1451.59	740.96	1284.03	786.29	1567.05	754.69	1378.29	745.90	1375.17
Feb-05	782.48	1315.24	787.53	1456.32	786.02	1276.38	865.06	1660.00	811.63	1388.88	833.90	1415.44
Mar-05	784.30	1296.45	798.44	1451.71	812.24	1344.90	826.56	1660.00	798.15	1381.63	811.61	1387.18
Apr-05	605.57	1576.00	581.37	1416.37	621.19	1239.60	609.49	1424.12	547.12	1231.65	581.91	1345.86
May-05	892.72	1660.00	977.06	1567.77	988.17	1414.11	963.12	1660.00	921.78	1437.88	899.40	1468.80
Jun-05	791.48	1538.90	805.76	1478.75	1559.54	1580.39	852.47	1603.78	763.00	1586.94	789.19	1543.11
Jul-05	754.67	765.31	793.21	1561.17	151.62	168.02	825.39	1451.09	754.93	0.00	758.67	1389.55
Aug-05	664.55	1550.24	487.62	1607.94	147.51	139.72	513.24	1063.07	487.54	1593.64	510.86	1096.09
Sep-05	797.98	453.24	779.57	1125.75	142.50	497.88	833.60	1551.85	779.70	1482.66	754.41	632.10
Oct-05	820.27	0.00	792.67	1208.98	139.49	870.26	887.56	1660.00	796.57	1465.77	998.74	53.62
Nov-05	483.96	0.00	546.06	1195.50	131.43	574.87	566.97	1246.84	516.84	1078.77	169.48	53.62
Dec-05	839.78	0.00	889.88	1085.32	102.99	1058.93	906.43	1660.00	863.43	1568.63	169.48	53.62
Jan-06	828.12	0.00	844.47	1606.37	123.15	565.50	822.43	1448.43	866.40	1610.78	169.48	53.62
Feb-06	607.00	130.39	590.33	1241.07	139.66	742.71	632.83	554.10	647.84	1538.13	169.48	150.23
Mar-06	848.93	135.30	877.12	1610.98	137.63	129.51	900.51	175.77	924.25	186.83	127.50	178.60

hours>1660 F

	F1 int temp	F1 tip temp	F2 int temp	F2 tip temp	F3 int temp	F3 tip temp	F4 int temp	F4 tip temp	F5 int temp	F5 tip temp	F6 int temp	F6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	0	0	0	0	0	0	0
Feb-05	0	0	0	0	0	0	0	3.25	0	0	0	0
Mar-05	0	0	0	0	0	0	0	2.5	0	0	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	3.75	0	0	0	0	0	106.75	0	0	0	0
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	0	0	0	0	0	0	0.75	0	0	0	0
Nov-05	0	0	0	0	0	0	0	0	0	0	0	0
Dec-05	0	0	0	0	0	0	0	0.5	0	0	0	0
Jan-06	0	0	0	0	0	0	0	0	0	0	0	0
Feb-06	0	0	0	0	0	0	0	0	0	0	0	0
Mar-06	0	0	0	0	0	0	0	0	0	0	0	0
	0	3.75	0	0	0	0	0	113.75	0	0	0	0

maximum reading

	B1 int temp	B1 tip temp	B2 int temp	B2 tip temp	B3 int temp	B3 tip temp	B4 int temp	B4 tip temp	B5 int temp	B5 tip temp	B6 int temp	B6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04	804.90	1156.71	811.64	1394.62	365.69	748.07	0.02	124.85	143.76	213.72	104.27	0.02
Oct-04	785.23	1055.74	833.21	1261.36	915.99	1182.91	923.33	1454.62	844.54	1087.17	783.02	1213.34
Nov-04	451.14	787.04	459.03	679.30	375.02	828.88	468.81	854.56	497.41	939.06	555.53	1131.59
Dec-04	457.29	774.56	453.35	712.48	361.22	809.07	388.93	657.67	434.87	778.35	491.53	939.75
Jan-05	440.00	793.16	456.65	633.17	442.82	852.91	451.21	617.86	438.28	792.14	503.70	928.86
Feb-05	494.54	978.77	505.27	1189.83	438.34	1012.37	437.47	757.15	432.53	796.35	488.15	994.31
Mar-05	760.27	1046.90	814.43	1401.04	806.10	1111.12	838.95	1414.63	798.50	1020.84	744.03	1099.93
Apr-05	375.57	791.71	384.39	505.19	373.14	777.86	401.54	535.18	371.97	909.26	455.92	904.85
May-05	815.45	1112.83	838.85	1481.96	804.99	1162.60	804.45	1362.52	743.67	1055.50	783.88	1142.62
Jun-05	366.97	759.44	391.25	735.76	371.42	865.63	405.31	484.34	363.54	904.96	445.76	825.23
Jul-05	505.62	758.98	509.40	891.49	494.28	907.13	524.56	623.90	487.78	913.25	537.28	840.94
Aug-05	618.26	864.57	638.05	1003.20	619.09	876.39	628.68	1036.79	609.57	864.48	644.68	937.85
Sep-05	352.29	769.84	378.09	919.70	368.59	822.03	424.10	1008.29	342.55	910.16	426.75	791.08
Oct-05	849.78	1112.40	899.98	1298.25	851.24	1150.12	869.48	1446.08	853.32	1125.08	820.64	1200.72
Nov-05	436.35	1040.51	439.75	938.73	422.05	1050.68	454.74	516.06	392.88	994.81	445.78	972.86
Dec-05	740.71	1029.53	766.49	1192.65	740.86	1401.76	743.64	154.54	733.79	1044.42	759.92	1112.95
Jan-06	861.93	663.43	892.68	1314.85	858.40	1602.11	831.85	154.54	839.23	1098.50	832.20	1256.24
Feb-06	359.91	663.43	379.58	911.12	410.11	449.02	423.43	154.54	313.59	969.24	437.81	1384.32
Mar-06	870.40	173.89	898.58	1385.41	866.86	161.25	824.50	171.11	845.12	1221.37	822.45	1395.51

hours>1660 F

	B1 int temp	B1 tip temp	B2 int temp	B2 tip temp	B3 int temp	B3 tip temp	B4 int temp	B4 tip temp	B5 int temp	B5 tip temp	B6 int temp	B6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	0	0	0	0	0	0	0
Feb-05	0	0	0	0	0	0	0	0	0	0	0	0
Mar-05	0	0	0	0	0	0	0	0	0	0	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	0	0	0	0	0	0	0	0	0	0	0
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	0	0	0	0	0	0	0	0	0	0	0
Nov-05	0	0	0	0	0	0	0	0	0	0	0	0
Dec-05	0	0	0	0	0	0	0	0	0	0	0	0
Jan-06	0	0	0	0	0	0	0	0	0	0	0	0
Feb-06	0	0	0	0	0	0	0	0	0	0	0	0
Mar-06	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

maximum reading

	D1 int temp	D1 tip temp	D2 int temp	D2 tip temp	D3 int temp	D3 tip temp	D4 int temp	D4 tip temp	D5 int temp	D5 tip temp	D6 int temp	D6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0.02	0.02	0.00	0.02	0.02	0.02	141.36	0.02	0.02	0.02	0.02	1040.75
Nov-04	967.79	1610.03	1004.26	1563.09	973.14	1660.00	1014.24	1542.69	966.12	1660.00	920.18	1418.35
Dec-04	788.18	1433.79	762.45	1416.42	825.57	1563.62	767.90	1413.28	789.22	1615.60	774.07	1351.78
Jan-05	725.98	1371.85	690.75	1304.10	758.48	1471.28	693.44	1350.99	733.50	1523.94	719.11	1302.55
Feb-05	941.39	1582.99	964.54	1570.52	968.22	1660.00	941.53	1610.93	955.82	1660.00	927.70	1471.12
Mar-05	910.40	1507.80	947.18	1517.00	976.05	1660.00	965.68	1550.11	929.55	1660.00	921.60	1419.82
Apr-05	342.60	667.02	390.29	845.09	392.04	690.34	380.41	933.30	393.93	383.41	394.16	817.14
May-05	1022.11	1660.00	1061.18	1660.00	1012.10	1660.00	1013.54	1611.05	999.65	1660.00	1029.04	1541.87
Jun-05	819.01	1538.63	799.35	1569.84	846.60	1660.00	788.84	1430.08	826.88	1660.00	805.48	1465.89
Jul-05	1004.58	1606.15	1041.02	1602.52	997.81	1660.00	1023.34	1607.59	988.36	1660.00	995.24	1660.00
Aug-05	593.50	1212.98	567.70	1407.46	635.72	1521.27	579.44	1346.43	597.29	1298.37	583.30	1443.75
Sep-05	355.25	728.36	411.66	1070.77	441.39	817.05	379.84	1017.76	432.96	1614.58	494.87	968.12
Oct-05	1014.10	1585.97	997.98	1660.00	889.37	1660.00	1018.13	1578.62	951.71	1588.49	951.72	1028.93
Nov-05	931.85	1516.21	983.89	1660.00	940.55	1660.00	1044.64	1610.42	969.75	0.00	972.13	1054.74
Dec-05	954.74	1595.73	1003.94	1660.00	975.80	1660.00	1061.86	1574.99	960.56	1660.00	965.63	1096.18
Jan-06	974.13	1572.67	1020.48	0.00	914.97	616.97	966.52	1599.30	901.52	1177.84	890.81	928.26
Feb-06	630.07	1211.73	655.32	1086.04	706.13	616.97	686.87	1332.44	630.99	1177.84	610.70	662.71
Mar-06	788.37	1505.64	754.13	169.08	829.95	174.29	818.40	1495.27	774.83	156.04	748.67	889.93

hours>1660 F

	D1 int temp	D1 tip temp	D2 int temp	D2 tip temp	D3 int temp	D3 tip temp	D4 int temp	D4 tip temp	D5 int temp	D5 tip temp	D6 int temp	D6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	18.25	0	0	0	19.25	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	0	0	0	0	0	0	0
Feb-05	0	0	0	0	0	104.75	0	0	0	213.75	0	0
Mar-05	0	0	0	0	0	37.75	0	0	0	169	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	89.25	0	105.25	0	135.5	0	0	0	135.5	0	0
Jun-05	0	0	0	0	0	1.25	0	0	0	1.25	0	0
Jul-05	0	0	0	0	0	8	0	0	0	7.75	0	2.5
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	0	0	117.5	0	118.25	0	0	0	0	0	0
Nov-05	0	0	0	588.75	0	668	0	0	0	0	0	0
Dec-05	0	0	0	93.75	0	162.5	0	0	0	163	0	0
Jan-06	0	0	0	0	0	0	0	0	0	0	0	0
Feb-06	0	0	0	0	0	0	0	0	0	0	0	0
Mar-06	0	0	0	0	0	0	0	0	0	0	0	0
	0	89.25	0	905.25	0	1254.25	0	0	0	709.5	0	2.5

maximum reading

	H1 int temp	H1 tip temp	H2 int temp	H2 tip temp	H3 int temp	H3 tip temp	H4 int temp	H4 tip temp	H5 int temp	H5 tip temp	H6 int temp	H6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nov-04	433.88	930.32	752.56	823.65	385.51	772.05	494.90	1138.22	507.95	1145.22	744.49	784.04
Dec-04	463.51	1112.45	462.98	1166.93	441.59	1158.16	593.50	1356.99	596.28	1328.21	440.14	957.50
Jan-05	909.47	1415.28	997.86	1471.71	1025.46	1660.00	1025.46	1480.68	1000.62	1510.43	941.66	1284.48
Feb-05	797.11	1314.72	1002.44	1578.59	807.53	1561.31	750.82	1328.52	808.13	1333.63	819.84	1226.42
Mar-05	582.48	1265.88	598.73	1341.81	630.74	1519.99	612.05	1372.30	620.12	1426.92	605.49	1148.88
Apr-05	389.77	890.77	358.89	781.24	363.92	530.79	365.71	824.25	366.45	934.68	346.51	776.31
May-05	977.73	1541.23	1065.88	1536.50	1043.40	1660.00	1027.70	1504.10	1081.59	1613.72	980.48	1298.68
Jun-05	878.37	1503.83	856.23	1450.34	956.56	1602.60	950.20	1477.39	939.59	1541.94	915.95	1258.22
Jul-05	658.93	1270.64	696.36	1577.91	734.25	1564.18	722.16	1287.65	716.01	1315.55	669.92	1046.81
Aug-05	570.08	1212.59	575.60	1471.12	597.69	1512.06	590.75	1282.83	579.28	1281.65	556.67	1030.84
Sep-05	382.47	817.93	355.11	523.32	404.52	501.23	391.56	1320.74	352.38	893.39	335.73	795.36
Oct-05	888.97	1471.67	566.06	1467.43	910.00	1660.00	985.56	1598.37	960.51	1660.00	910.65	1380.01
Nov-05	725.42	1213.70	441.95	1235.62	757.54	1602.60	777.82	1220.78	781.50	1503.34	734.70	1523.72
Dec-05	400.79	1213.70	325.72	343.06	389.34	472.83	382.02	726.44	344.95	631.63	327.37	772.70
Jan-06	396.18	1213.70	319.32	341.46	364.58	385.79	407.57	662.06	334.25	624.40	322.52	772.70
Feb-06	1031.03	1213.70	1081.20	1660.00	1034.80	1660.00	1037.27	1427.20	1093.50	1660.00	945.43	772.70
Mar-06	811.05	153.03	833.39	1660.00	871.78	1604.85	925.35	1380.63	734.86	1513.53	838.32	155.27

hours>1660 F

	H1 int temp	H1 tip temp	H2 int temp	H2 tip temp	H3 int temp	H3 tip temp	H4 int temp	H4 tip temp	H5 int temp	H5 tip temp	H6 int temp	H6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	346	0	0	0	0	0	0
Feb-05	0	0	0	0	0	0	0	0	0	0	0	0
Mar-05	0	0	0	0	0	0	0	0	0	0	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	0	0	0	0	121.5	0	0	0	0	0	0
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	0	0	0	0	3.75	0	0	0	1.5	0	0
Nov-05	0	0	0	0	0	0	0	0	0	0	0	0
Dec-05	0	0	0	0	0	0	0	0	0	0	0	0
Jan-06	0	0	0	0	0	0	0	0	0	0	0	0
Feb-06	0	0	0	573	0	103.5	0	0	0	211.25	0	0
Mar-06	0	0	0	26.75	0	0	0	0	0	0	0	0
	0	0	0	599.75	0	574.75	0	0	0	212.75	0	0

maximum reading

	C1 int temp	C1 tip temp	C2 int temp	C2 tip temp	C3 int temp	C3 tip temp	C4 int temp	C4 tip temp	C5 int temp	C5 tip temp	C6 int temp	C6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0.00	0.02	0.02	0.02	0.02	130.38	0.02	0.02	123.90	0.02	0.02	132.40
Nov-04	694.02	1205.50	774.84	1280.86	746.15	1526.56	747.53	1314.58	712.60	1361.82	668.02	1086.54
Dec-04	698.68	1217.34	759.94	1259.45	764.59	1596.99	744.22	1267.62	723.55	1349.34	688.95	1035.57
Jan-05	719.08	1271.17	785.85	1322.55	783.63	1602.35	779.02	1365.62	754.72	1419.92	715.72	1123.52
Feb-05	853.58	1259.30	911.24	1320.13	953.86	1660.00	953.15	1326.51	838.82	1459.16	864.24	1130.90
Mar-05	896.94	1378.17	983.06	1438.79	1021.91	1660.00	1007.47	1482.48	891.45	1548.29	894.92	1299.71
Apr-05	842.79	1377.68	902.45	1368.17	966.19	1660.00	916.93	1448.96	891.39	1599.05	905.02	1405.93
May-05	960.65	1426.35	1013.39	1452.83	1023.10	1660.00	1026.96	1486.76	978.03	1613.08	917.38	1415.12
Jun-05	364.06	951.19	345.35	956.06	389.43	500.32	392.48	1027.33	375.57	754.30	402.68	854.90
Jul-05	624.75	1282.22	686.17	1154.01	672.23	1458.65	555.14	1265.60	638.05	1380.78	635.72	1186.96
Aug-05	551.66	1026.46	582.77	685.91	520.90	1115.47	455.95	879.82	480.19	1046.39	573.11	912.49
Sep-05	623.98	1172.31	669.47	960.83	673.50	1416.75	581.12	1161.36	633.21	1315.20	651.20	1019.27
Oct-05	946.51	1355.52	980.04	1018.25	1002.87	1660.00	1036.23	1420.02	921.51	1598.30	894.64	1294.22
Nov-05	808.80	1307.00	887.82	1188.09	823.20	1660.00	810.16	1370.89	761.10	1461.34	771.91	1137.32
Dec-05	323.03	1202.61	352.64	1081.69	378.09	444.98	378.00	874.98	346.19	646.63	378.01	912.36
Jan-06	941.67	1451.21	1016.27	922.81	990.75	1660.00	1022.88	1562.00	948.33	1660.00	899.79	1477.44
Feb-06	310.94	967.32	329.29	742.61	375.99	459.03	367.08	842.97	410.00	747.72	390.35	1477.44
Mar-06	529.07	950.91	560.81	161.98	542.05	1129.05	545.41	989.37	706.01	1390.50	723.68	150.89

hours>1660 F

	C1 int temp	C1 tip temp	C2 int temp	C2 tip temp	C3 int temp	C3 tip temp	C4 int temp	C4 tip temp	C5 int temp	C5 tip temp	C6 int temp	C6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	0	0	0	0	0	0	0
Feb-05	0	0	0	0	0	61.75	0	0	0	0	0	0
Mar-05	0	0	0	0	0	165.25	0	0	0	0	0	0
Apr-05	0	0	0	0	0	90.75	0	0	0	0	0	0
May-05	0	0	0	0	0	41.25	0	0	0	0	0	0
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	0	0	0	0	42.75	0	0	0	0	0	0
Nov-05	0	0	0	0	0	0.5	0	0	0	0	0	0
Dec-05	0	0	0	0	0	0	0	0	0	0	0	0
Jan-06	0	0	0	0	0	33.25	0	0	0	1	0	0
Feb-06	0	0	0	0	0	0	0	0	0	0	0	0
Mar-06	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	435.5	0	0	0	1	0	0

maximum reading

	G1 int temp	G1 tip temp	G2 int temp	G2 tip temp	G3 int temp	G3 tip temp	G4 int temp	G4 tip temp	G5 int temp	G5 tip temp	G6 int temp	G6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	480.74	871.84	472.04	774.35	421.51	920.78	362.48	791.74	520.11	625.47	483.62	787.63
Nov-04	806.99	1156.02	789.30	1019.55	894.90	1199.37	873.04	1026.71	803.48	1102.20	760.22	960.41
Dec-04	422.31	843.24	435.39	759.15	399.13	858.65	378.06	788.35	461.46	562.35	434.88	749.05
Jan-05	676.97	1032.70	670.51	917.51	687.43	1106.10	664.64	954.25	674.38	1067.58	617.08	883.25
Feb-05	444.38	813.10	498.46	744.04	507.22	858.71	476.64	800.25	504.52	682.89	440.72	760.54
Mar-05	756.61	1197.19	779.34	1584.79	898.08	1241.23	835.03	1020.56	779.98	943.76	733.40	935.96
Apr-05	381.52	1338.54	419.35	1264.43	362.73	939.65	311.37	777.55	384.93	688.86	398.79	1575.28
May-05	831.72	1225.82	778.62	1051.84	917.45	1404.30	894.63	1138.28	863.53	1186.58	814.73	1564.64
Jun-05	854.30	1291.53	787.42	1051.84	881.78	1451.13	899.47	1179.24	867.63	1222.78	843.25	1216.23
Jul-05	790.87	1256.11	761.61	1051.84	920.16	1503.23	821.23	1193.79	806.79	1130.49	837.47	1199.98
Aug-05	799.10	1317.91	755.52	1308.82	862.07	1530.28	797.66	1212.64	790.06	1168.20	837.86	1267.37
Sep-05	760.97	1275.60	766.65	1331.54	859.37	1520.62	795.39	1254.84	810.16	1235.67	797.02	1219.41
Oct-05	879.85	1357.62	863.57	1416.18	805.59	1414.97	738.94	1380.94	778.92	1144.74	828.68	1442.93
Nov-05	450.34	602.11	432.80	0.00	486.31	1231.18	460.25	973.03	436.17	525.90	445.94	1280.70
Dec-05	365.56	800.41	363.92	0.00	394.66	1167.96	355.38	985.25	379.78	606.57	401.23	603.97
Jan-06	749.33	334.84	726.09	0.00	756.33	1167.96	770.73	1538.13	711.30	1037.88	709.15	1166.38
Feb-06	455.27	334.84	438.83	131.35	457.38	1167.96	467.56	916.83	455.15	916.69	491.79	717.45
Mar-06	661.51	136.87	637.34	135.92	679.82	116.37	642.54	127.85	609.82	1541.19	591.73	898.37

hours>1660 F

	G1 int temp	G1 tip temp	G2 int temp	G2 tip temp	G3 int temp	G3 tip temp	G4 int temp	G4 tip temp	G5 int temp	G5 tip temp	G6 int temp	G6 tip temp
Apr-04												
May-04												
Jun-04												
Jul-04												
Aug-04												
Sep-04												
Oct-04	0	0	0	0	0	0	0	0	0	0	0	0
Nov-04	0	0	0	0	0	0	0	0	0	0	0	0
Dec-04	0	0	0	0	0	0	0	0	0	0	0	0
Jan-05	0	0	0	0	0	0	0	0	0	0	0	0
Feb-05	0	0	0	0	0	0	0	0	0	0	0	0
Mar-05	0	0	0	0	0	0	0	0	0	0	0	0
Apr-05	0	0	0	0	0	0	0	0	0	0	0	0
May-05	0	0	0	0	0	0	0	0	0	0	0	0
Jun-05	0	0	0	0	0	0	0	0	0	0	0	0
Jul-05	0	0	0	0	0	0	0	0	0	0	0	0
Aug-05	0	0	0	0	0	0	0	0	0	0	0	0
Sep-05	0	0	0	0	0	0	0	0	0	0	0	0
Oct-05	0	0	0	0	0	0	0	0	0	0	0	0
Nov-05	0	0	0	0	0	0	0	0	0	0	0	0
Dec-05	0	0	0	0	0	0	0	0	0	0	0	0
Jan-06	0	0	0	0	0	0	0	0	0	0	0	0
Feb-06	0	0	0	0	0	0	0	0	0	0	0	0
Mar-06	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

month								
Apr-04	575	517	570	582	1091	761	561	572
	67	110	23	65	2	20		35
		33	3	54	104	2		153
		51	52		207			74
			78		42			
					39			
	160.5	177.75	181.5	175.25	371.25	195.75	140.25	208.5

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
May-04	75	49	252	137	146	53	61	215
	36	51	142	79		170	53	82
	53	8	58	4		63		104
	50	15	10	307		78		
	2		49	76		1		
			91	4				
			34					
			43					
			51					
			45					
			310					
	54	30.75	271.25	151.75	36.5	91.25	28.5	100.25

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Jun-04	5		391	2	5	3	2	
	1		21		108		12	
	1		22				3	
	920		1142					
	42							
	150							
	218							
	1							
	334.5	0	394	0.5	28.25	0.75	4.25	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Jul-04		27	873		16	3	760	
		34	6		7		2	
		10	5		12			
		10			1239			
		1						
		26						
	0	27	221	0	318.5	0.75	190.5	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Aug-04	76	1112	78		1235		1	36
			28		2		17	1
					195			145
								3
	19	278	26.5	0	358	0	4.5	46.25

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Sep-04		2750			4	118		30
		1				1		2
		28				3		2

								8
								11
								37
	0	694.75	0	0	1	30.5	0	22.5

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Oct-04	2392	121			25	120	22	7
						22		
						221		
	598	30.25	0	0	6.25	90.75	5.5	1.75

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Nov-04	2880	1	14	1	1	1	17	1
		2		1	1	1	45	1
		2		45		2	1	
		1		1		9	1	
				82		1		
				2		11		
				28				
				2				
				1				
	720	1.5	3.5	40.75	0.5	6.25	16	0.5

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Dec-04	2202					145		
	1							
	550.75	0	0	0	0	36.25	0	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Jan-05	135	1	2	1	2	1	108	3
	136	1	129	2	1	2	39	2578
	2	1	73	139	148	122		
	17	103	6	1	5	6		
				5	6			
	72.5	26.5	52.5	37	40.5	32.75	36.75	645.25

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Feb-05	25	693	1192	30	747	724	673	287
	722	2	27	1635		6		1
	7					29		721
						6		
	188.5	173.75	304.75	416.25	186.75	191.25	168.25	252.25

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Mar-05	1	11	2611	970	1	5	159	2
		1		1	3	3		1
		134			1	4		1
		1			2	22		
						1		
	0.25	36.75	652.75	242.75	1.75	8.75	39.75	1

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Apr-05	2		2876			2		
	0.5	0	719	0	0	0.5	0	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
May-05	481	207	469	545	18	599	209	712
	12	49	140	217	223	198	122	
			210		4			
			33					
	123.25	64	213	190.5	61.25	199.25	82.75	178

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Jun-05				6		6	2880	
						4		
						5		
	0	0	0	1.5	0	3.75	720	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Jul-05	19	3	7	34	13	5	2976	9
	96	72	84	11	103	12		100
				99		95		
	28.75	18.75	22.75	36	29	28	744	27.25

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Aug-05	251	228	241	1	3	246	2976	250
	306	276	293	255	259	301		305
	3	1	1	309	311	1		
	10	5			5			
	142.5	127.5	133.75	141.25	144.5	137	744	138.75

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Sep-05	8	1	1	1	2	11	2880	
			2		1			
					4			
	2	0.25	0.75	0.25	1.75	2.75	720	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Oct-05	32	333	147	162	1	1	570	188
	194	4	14	20	43	11	40	
	153		174	475	158	142	7	
	15				801	12	5	
	3					20	123	
						1	4	
						3		
						20		
	99.25	84.25	83.75	164.25	250.75	52.5	187.25	47

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Nov-05	203	175	199	2880	210	4	181	142
						193		58
	50.75	43.75	49.75	720	52.5	49.25	45.25	50

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Dec-05	16	11		651		1915		
	1	20		119				
	7							
	7							
	7.75	7.75	0	192.5	0	478.75	0	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Jan-06	82	58	60	84	132	2121		
		15	74			174	21	
		6	13					
	20.5	19.75	36.75	21	33	573.75	5.25	0

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Feb-06	9			7	143	4	2	2685
	13							
	5.5	0	0	1.75	35.75	1	0.5	671.25

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Mar-06	66	13	56	70	1648	14	54	65
	242	184	187	323	206	62	174	1
	6	1051	5	12	9	189	2	198
						2		6
	78.5	312	62	101.25	465.75	66.75	57.5	67.5

per OEM mill curve with one mill out of service @ boiler full load 6,400,000 lb/hr

Curve shows 8 mills @ 90,000 lb/hr (45TPH) ⇒ 360 TPH total

For 7 (360/7) = 51.4286 TPH ⇒ 102.86 mlb/hr (51.43 TPH) (75.63% fdr speed

On curve @ 102.86 mlb/hr PA Present Curve hits @ 62,000 ft³/min

@ @ 150°F & 29.92" Hg ⇒ 0.0651 lb/ft³

62,000 ft³/min * 0.0651 lb/ft³ * 60 min/hr = 242,172 lb/hr @ 51.43 TPH (75.63%)

+5% 254,281 lb/hr

Section 4.1 Workmanship and Quality:

Pg 1

- Primary air flows shall be within ± 5% of the mill manufacturers design primary air flow vs. coal flow curve

Part C - Division C2

Pg C2-1 1.

a. The new burners shall provide for a continuous boiler operation at 6,900,000 pounds/hour output - - -

@ 6,900 mlb/hr on OEM expanding out crosses @ 110 mlb/hr ⇒ 55.0 TPH

55.0 TPH * 7 = 385 TPH total
crosses @ 63.5 mcfm @ 150°F ⇒ 248,031 lb/hr
+5% = 260,433 lb/hr

Sect 7 7.2 pg 5

In the ABT design, all wear is limited to the wear-resistant devices in the elbow.
∴ the only erosion-prone areas will be located within the elbow.

design Flowrate 4100 lb/min old B&W curves ⇒ 246,000 lb/hr
350 °F design Temp
-.5 "wc Boiler design static
design density @ measuring device 0.0449 lb/ft³

(75,000 cfm using 4100 lb/min 150 °F outlet From curve)

Static press 30" WC
barometric press 25.21 "Hg

62,980 cfm calc using 4100 lb/min outlet @

$$d = \frac{1.328\ (25.21 + \frac{30}{13.60})}{350 + 460} = 0.0449\ lb/ft^3 \quad @ \text{ measuring device}$$

From B&W Noel Moen, Don Dugan & Aug 1998 B&W letter

Base Air Flow 27 ft³ air/lb coal Full load only (68 TPH)

$$(27\ ft^3\ air/lb\ coal)(68\ \tfrac{tons\ coal}{hr})(2000\ lb/ton)(1\ hr/60\ min) = 61,200\ ft^3/min\ air$$

$$d = \frac{1.328\ (29.92)}{150 + 460} = 0.0651\ lb/ft^3 \quad @ \text{ pulv outlet}$$

$$(61,200\ ft^3/min\ air)(0.0651\ lb/ft^3\ air)(60\ min/hr) = 239,047\ lb/hr \text{ outlet} = 3984\ lb/min$$

In controls 237,300 lb/hr @ 100%
3955 lb/min
65.9 lb/sec

Startup set points

$$(71,400\ ft^3/min\ air)(0.0651\ lb/ft^3\ air)(60\ min/hr) = 278,888\ lb/hr = 4648\ lb/min$$
77.5 lb/sec

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Garry Christensen" <Garry-C@ipsc.com>
Date: 10/28/2005 8:32:59 AM
Subject: RE: The remaining pictures

Thanks Garry.
The entire fuel injector assembly can be unbolted from the burner cover plate and removed as one piece (with inner zone damper and fixed vane spinner attached. We will provide our recommendations and an arrangement drawing for discussion on design for upgrading fuel injector & elbow design to a longer wear life. The pictures and descriptions you provided are very helpful in that respect.

In response to Dean's phone question yesterday morning, the fuel injector was designed based on the OEM Mill "Present Curve" (see email attachment) for full load, with one mill out of service. Based on the curve the burner design point is 62 MCFM PA flow @ 102 MLB/hr coal flow. Operating at higher flow rates than designed will result both in degrading performance as well as increase wear.
Sal

-----Original Message-----
From: Garry Christensen [mailto:Garry-C@ipsc.com]
Sent: Thursday, October 27, 2005 5:33 PM
To: sal@advancedburner.com
Subject: The remaining pictures

Sorry about that, the remaining pictures are attached. Are the nozzles replaceable and if so can they be removed with the tip attached? Also, what other components need to be unattached?

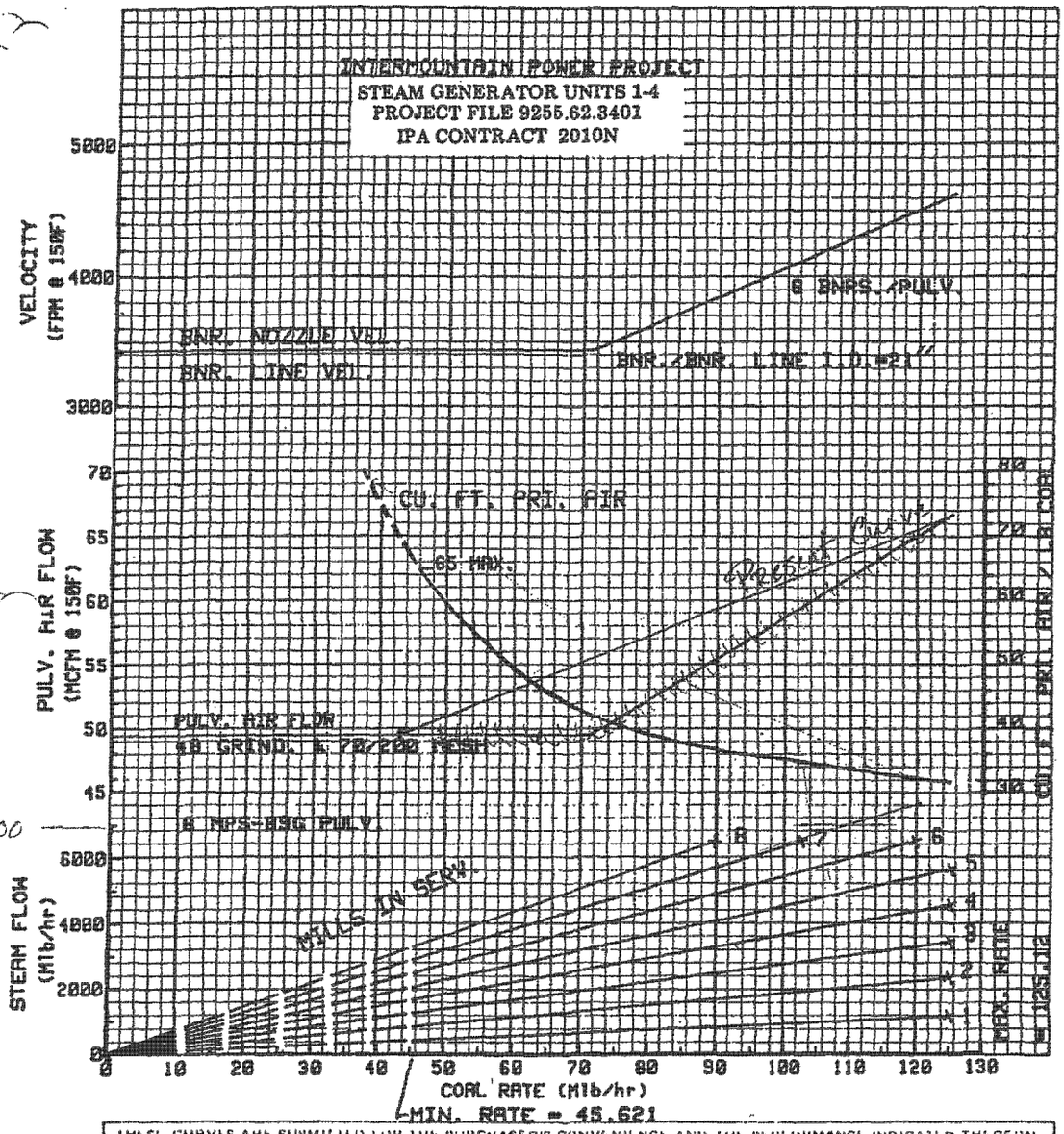
We do want you to look into a ceramic lined coal barrell/nozzle with a different engineered tip. ie less angle and modification of the X-vane. I hope you will be able to come out soon and sit down and discuss the issues so we can come up with a game plan and get needed parts/new equipment in time for April's outage.

CC: "Dean Wood" <Dean-W@ipsc.com>

PG 896-4

Babcock & Wilcox

CONTRACT INFORMATION SHEET



Full load 360 TPH required @ 6.4 million lb/h

THESE CURVES ARE SUBMITTED FOR THE PURCHASER'S CONVENIENCE AND THE PERFORMANCE INDICATED THEREON SHALL NOT BE OFFERED BY THE COMPANY OR CONSTRUED BY THE PURCHASER AS A PROPOSAL OR CONTRACT OBLIGATION.

DRAWN BY	DATE	APPROVED BY	DATE	A.O.
J. NEIDERT	2-1-82	RBH	2-5-82	

REL. NO. AND DATE	CONTRACT NO.	FILE NO.
1 9-8-82	334-0614	RB-614

TITLE – PULVERIZER-BURNER COORDINATION CURVES - COAL (B)

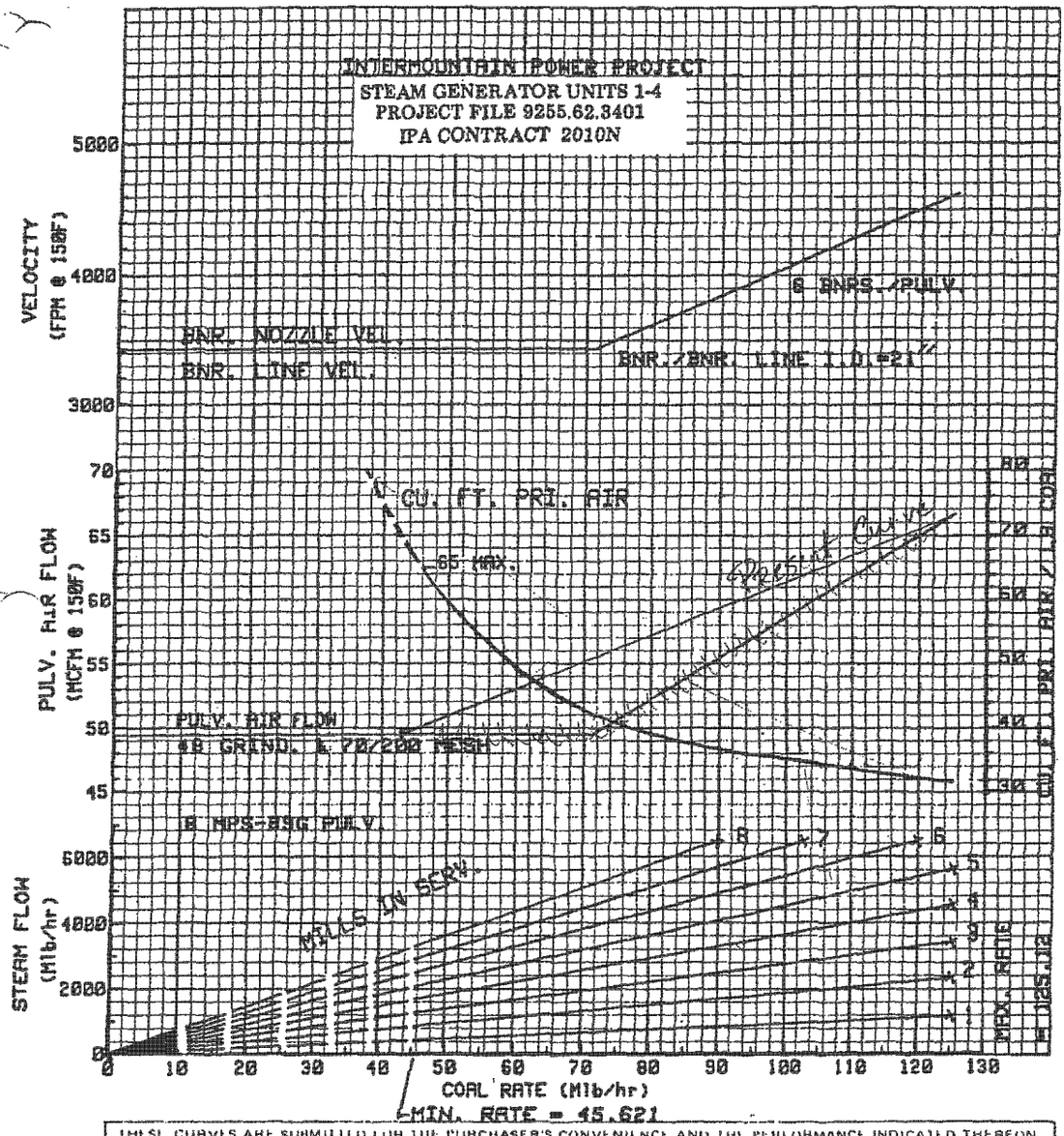
CIS– 101.05

design range 10,500 to 12,000 BTU/lb
high performance coal 11,000 BTU

PG 896-4

Babcock & Wilcox

CONTRACT INFORMATION SHEET



Full load 360 TPH required @ 6.4 million lb/h

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J. NEIDERT	2-1-82	R&H	2-5-82	

REL. NO. AND DATE	CONTRACT NO.	FILE NO.
1 9-8-82	334-0614	RB-614

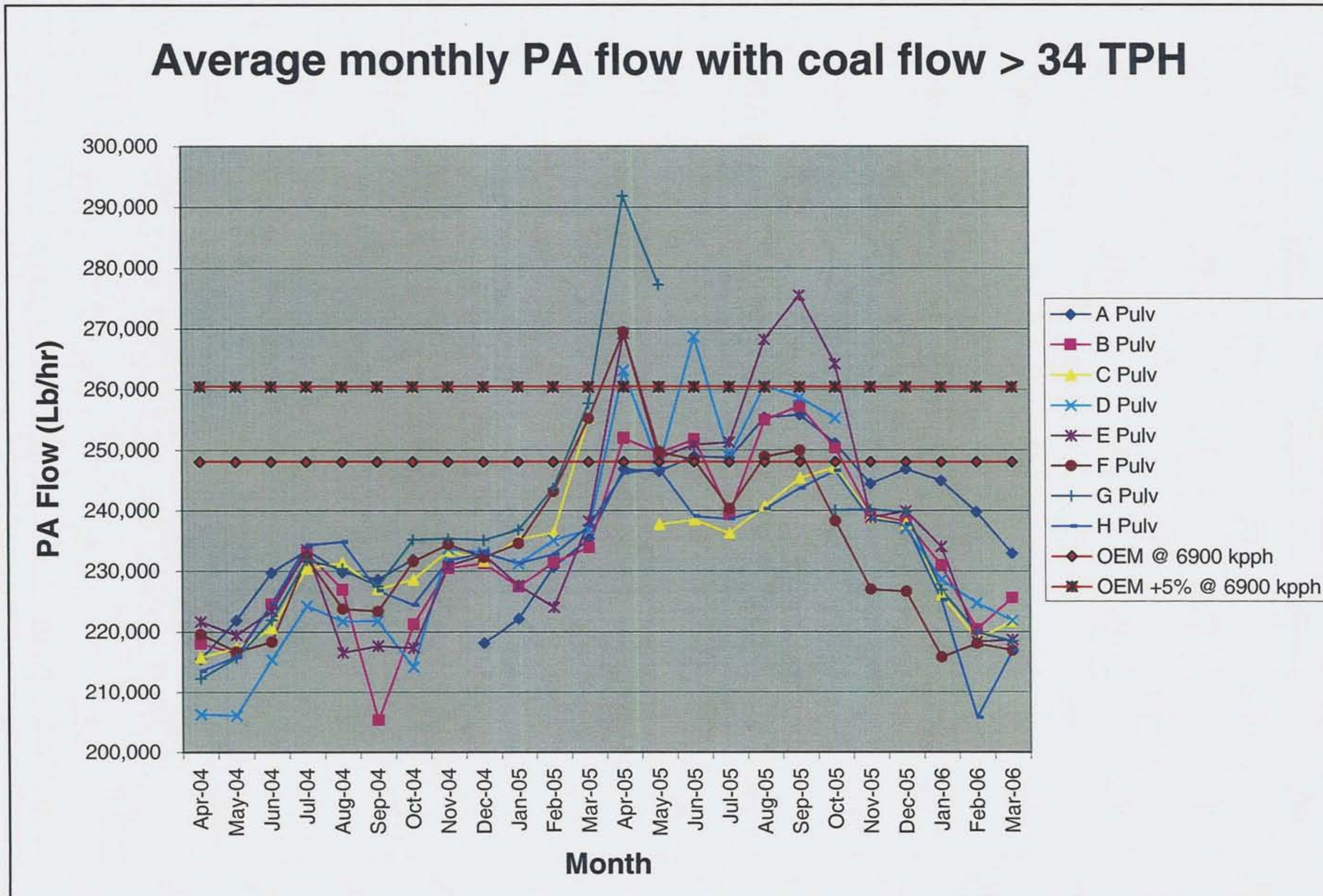
TITLE – PULVERIZER-BURNER COORDINATION CURVES - COAL (B) CIS– 101.05

G pulv	291,858	Apr-05	
G pulv	277,282	May-05	
E pulv	275,509	Sep-05	✓
F pulv	269,423	Apr-05	
E pulv	269,221	Apr-05	
D pulv	268,784	Jun-05	✓
E pulv	268,216	Aug-05	✓
E pulv	264,186	Oct-05	✓
D pulv	263,174	Apr-05	✓
D pulv	260,724	Aug-05	

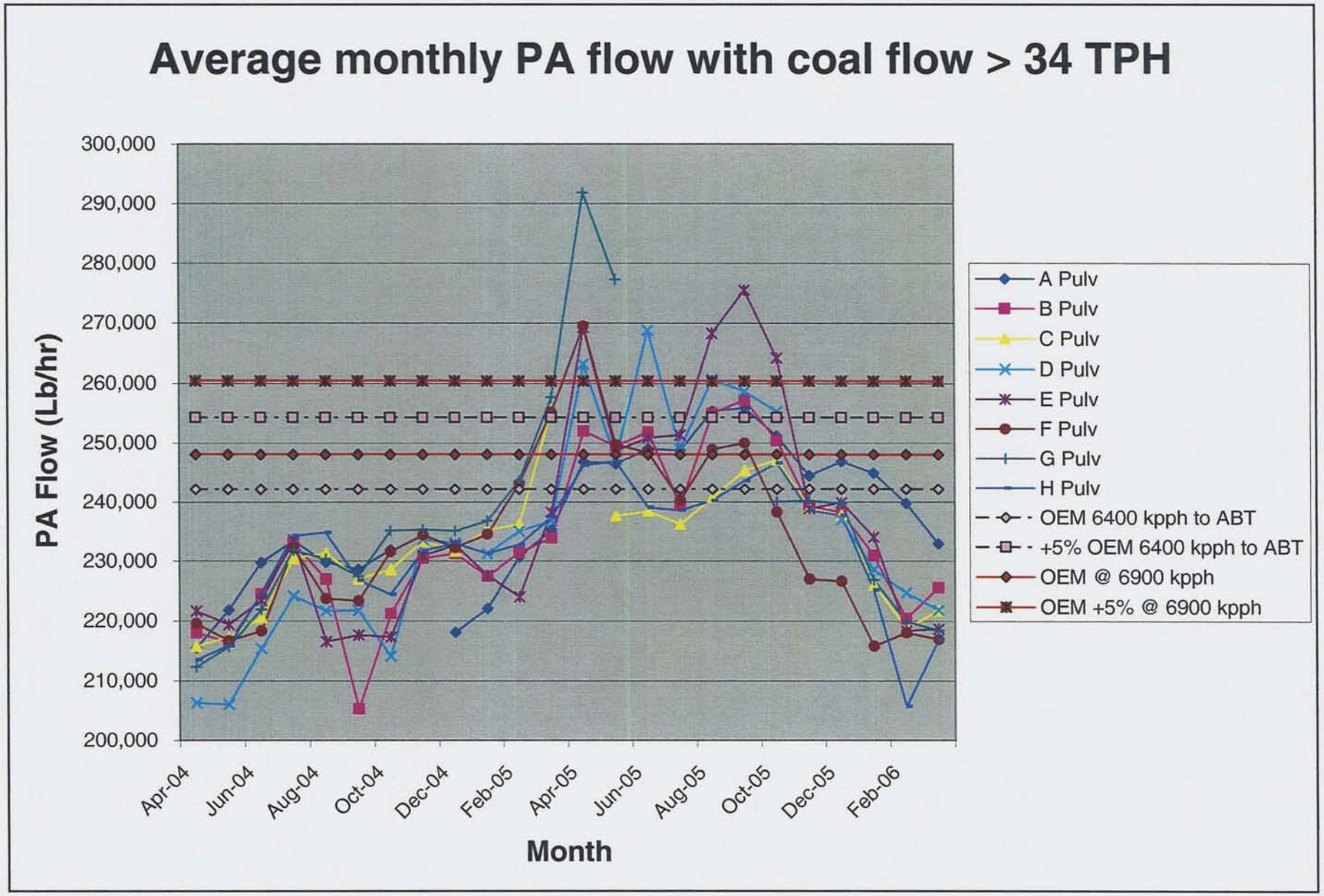
OEM +5% @ 6900 Kpph 260,433

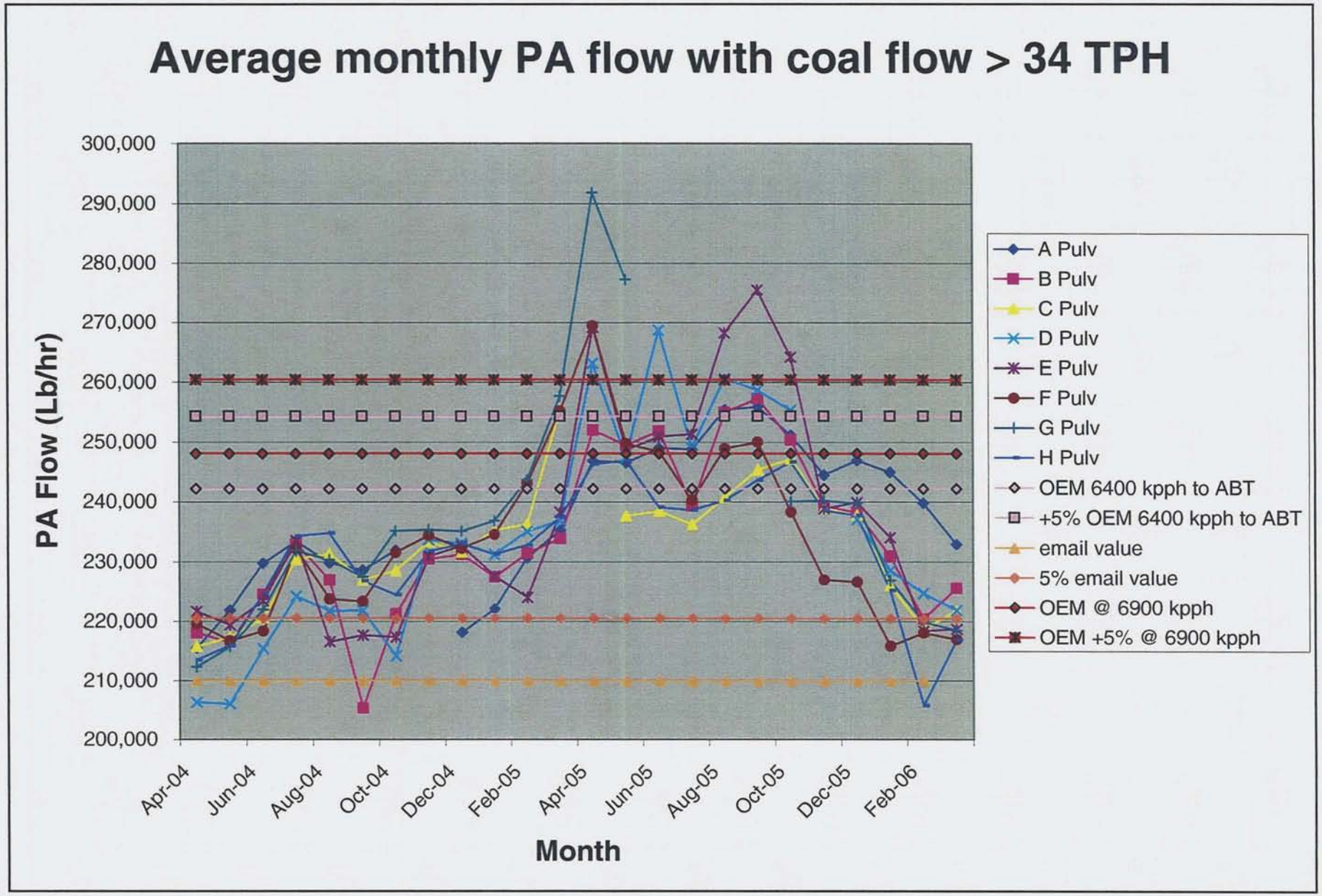
PA flow average over time Pulv coal flow > 34 tph

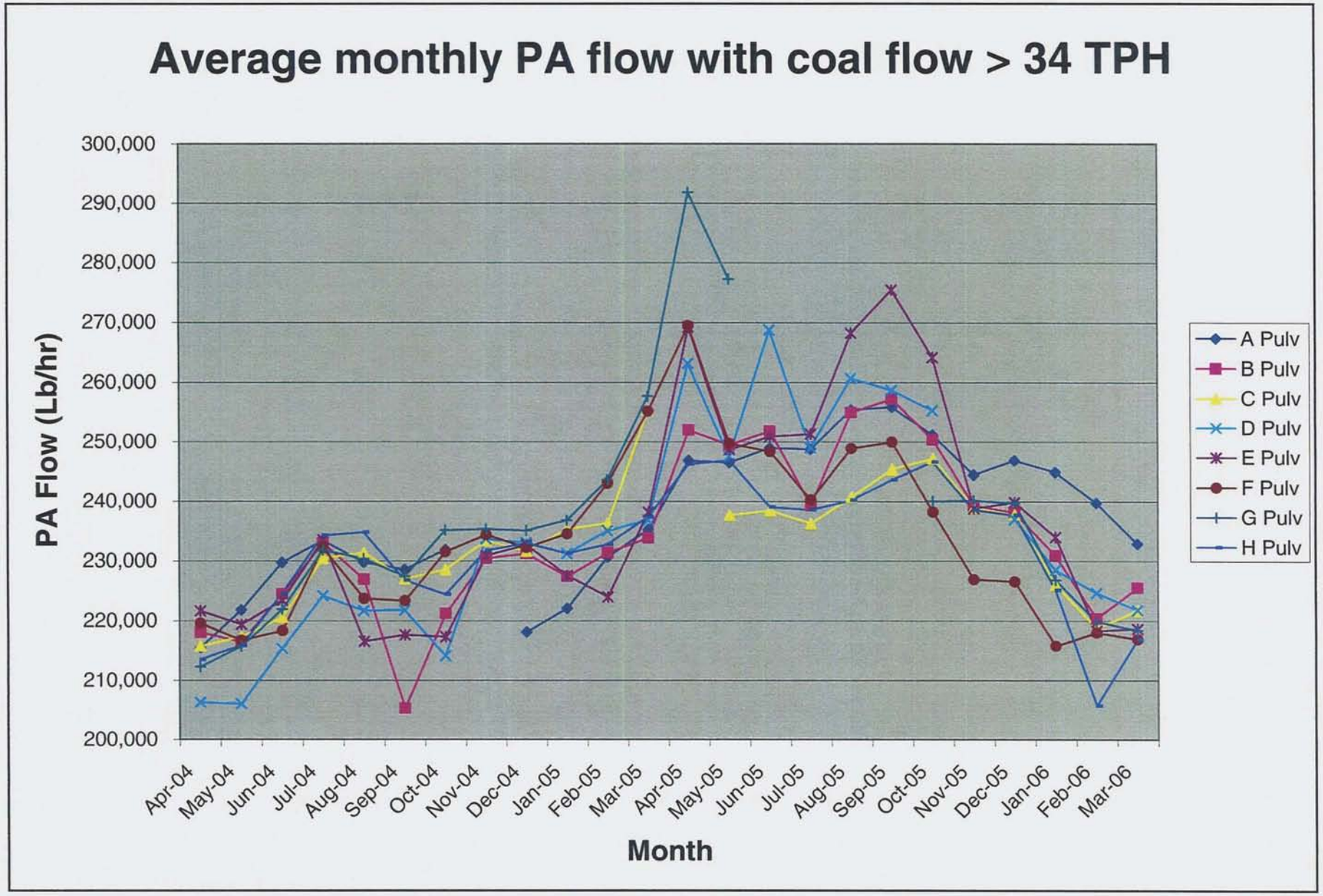
summary	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
Apr-04	215,509	218,009	215,804	206,315	221,619	219,578	212,301	213,513
May-04	221,835	216,438	217,311	206,066	219,395	216,709	215,740	215,907
Jun-04	229,734	224,469	220,564	215,403	223,409	218,329	221,922	224,611
Jul-04	233,415	232,971	230,447	224,236	233,520	232,144	231,799	234,237
Aug-04	229,795	226,900	231,325	221,748	216,560	223,710	230,380	234,806
Sep-04	228,591	205,259	227,039	221,830	217,624	223,324	227,468	226,784
Oct-04	231,898	221,212	228,579	214,187	217,321	231,523	235,160	224,409
Nov-04		230,434	233,375	233,663	230,857	234,379	235,336	231,719
Dec-04	218,133	231,173	231,622	233,074	232,642	232,230	235,110	232,925
Jan-05	222,115	227,400	235,284	231,204	227,589	234,537	236,803	231,279
Feb-05	230,673	231,370	236,286	235,059	223,987	243,070	243,615	232,776
Mar-05	235,279	233,859	255,380	236,863	238,209	255,200	257,714	237,403
Apr-05	246,825	251,977		263,174	269,221	269,423	291,858	246,200
May-05	246,476	249,421	237,687	247,542	248,661	249,705	277,282	246,885
Jun-05	248,961	251,788	238,452	268,784	250,892	248,342		239,055
Jul-05	248,727	239,344	236,224	249,001	251,311	240,289		238,608
Aug-05	255,407	254,964	240,726	260,724	268,216	248,877		240,251
Sep-05	255,881	257,271	245,353	258,746	275,509	249,998		243,659
Oct-05	251,196	250,371	247,139	255,350	264,186	238,287	240,067	246,618
Nov-05	244,459	239,394	238,918		238,874	227,009	240,195	238,594
Dec-05	246,872	238,176	237,844	237,036	239,917	226,649	239,758	237,753
Jan-06	244,947	230,969	226,013	228,584	234,050	215,841	226,891	225,223
Feb-06	239,794	220,455	218,748	224,725	218,409	218,096	219,911	205,754
Mar-06	232,916	225,606	221,733	221,872	218,709	216,975	218,466	216,910
maximum	255,881	257,271	255,380	268,784	275,509	269,423	291,858	246,885


Average monthly PA flow with coal flow > 34 TPH
PA Flow (Lb/hr)
300,000
290,000
280,000
270,000
260,000
250,000
240,000
230,000
220,000
210,000
200,000
Apr-04
May-04
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Month
A Pulv
B Pulv
C Pulv
D Pulv
E Pulv
F Pulv
G Pulv
H Pulv
OEM @ 6900 kpph
OEM +5% @ 6900 kpph

IP7021427


Average monthly PA flow with coal flow > 34 TPH
PA Flow (Lb/hr)
300,000
290,000
280,000
270,000
260,000
250,000
240,000
230,000
220,000
210,000
200,000
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
Feb-06
Month
A Pulv
B Pulv
C Pulv
D Pulv
E Pulv
F Pulv
G Pulv
H Pulv
OEM 6400 kpph to ABT
+5% OEM 6400 kpph to ABT
OEM @ 6900 kpph
OEM +5% @ 6900 kpph


Average monthly PA flow with coal flow > 34 TPH
PA Flow (Lb/hr)
300,000
290,000
280,000
270,000
260,000
250,000
240,000
230,000
220,000
210,000
200,000
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
Feb-06
Month
A Pulv
B Pulv
C Pulv
D Pulv
E Pulv
F Pulv
G Pulv
H Pulv
OEM 6400 kpph to ABT
+5% OEM 6400 kpph to ABT
email value
5% email value
OEM @ 6900 kpph
OEM +5% @ 6900 kpph

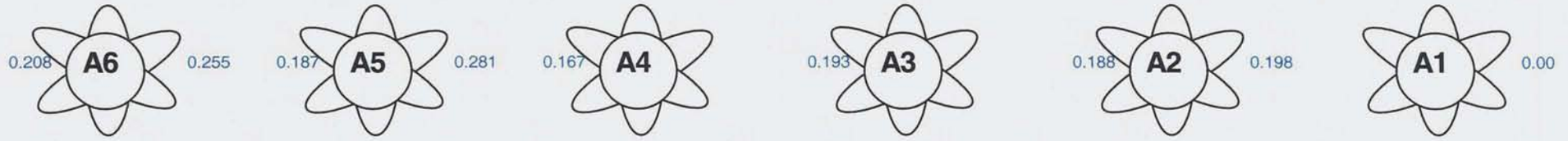

Average monthly PA flow with coal flow > 34 TPH
PA Flow (Lb/hr)
300,000
290,000
280,000
270,000
260,000
250,000
240,000
230,000
220,000
210,000
200,000
Apr-04
May-04
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Month
A Pulv
B Pulv
C Pulv
D Pulv
E Pulv
F Pulv
G Pulv
H Pulv

8th Floor

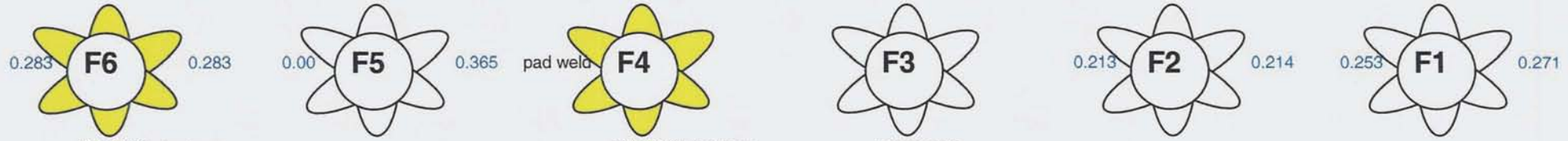
Erosion readings at 3 & 9 o'clock positions

Apr-06

7th Floor



6th Floor



33" SS tip laydown

33" SS tip laydown

new nozzle

5th Floor

33" SS tip laydown

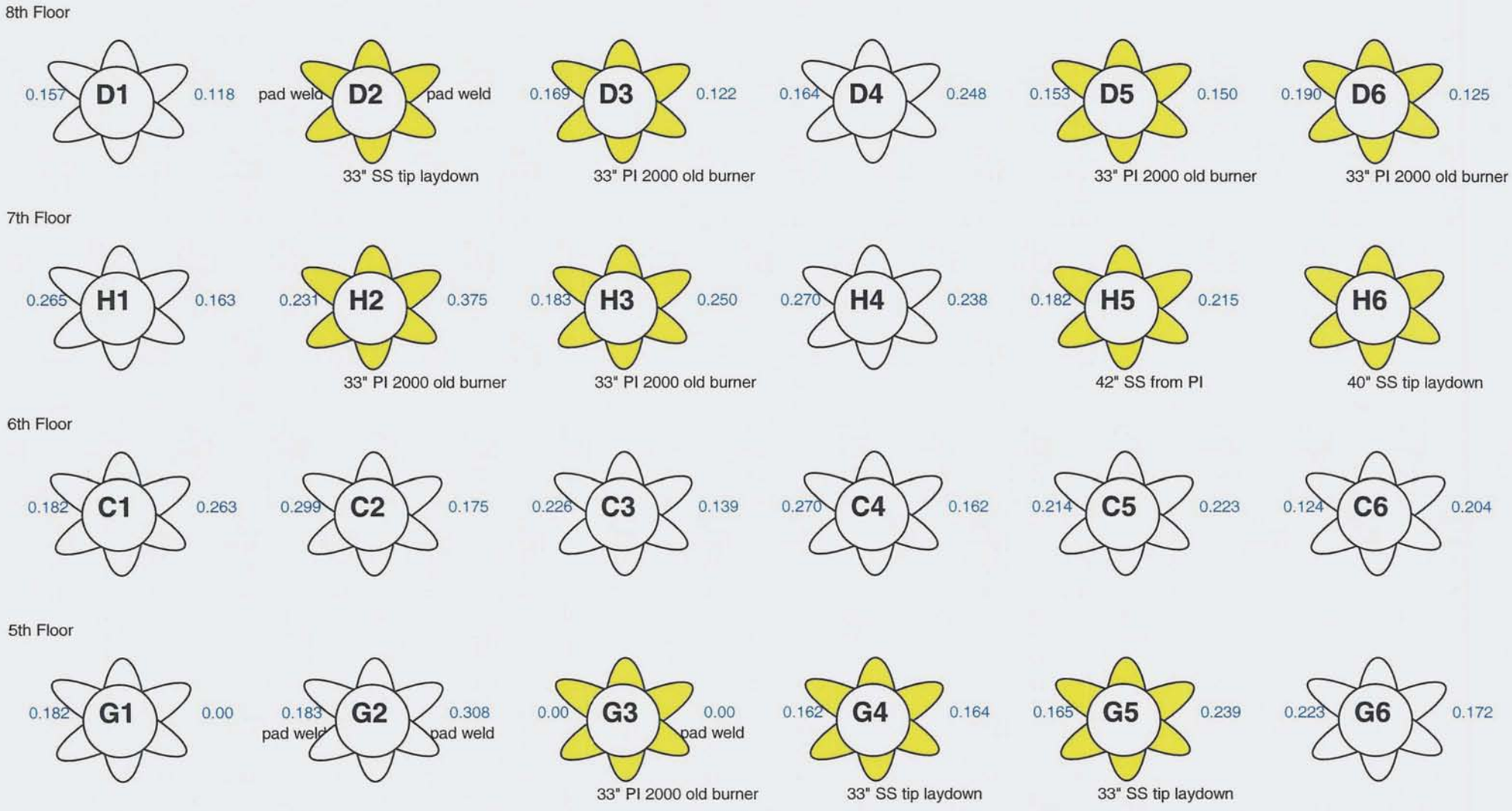
33" SS tip laydown

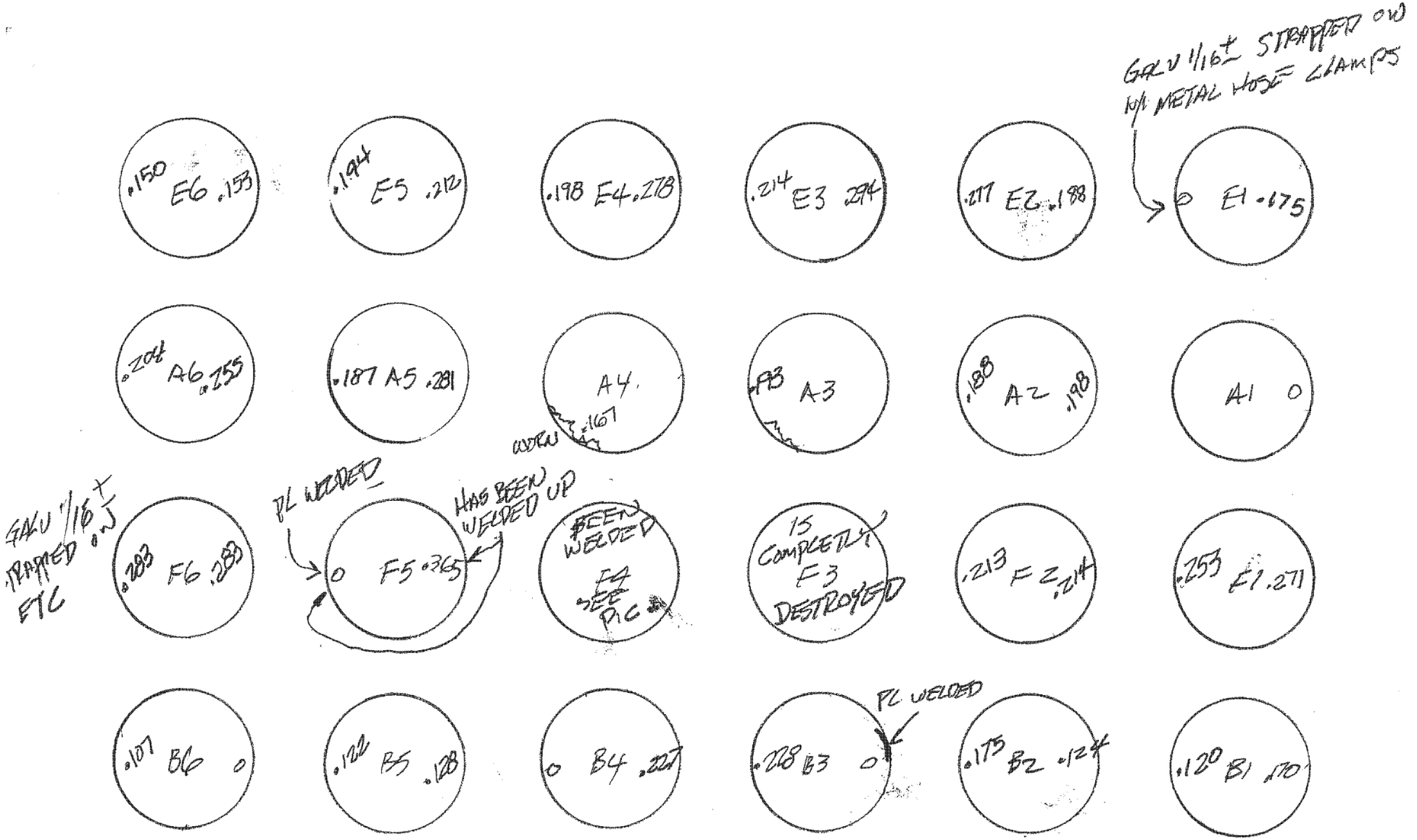
West

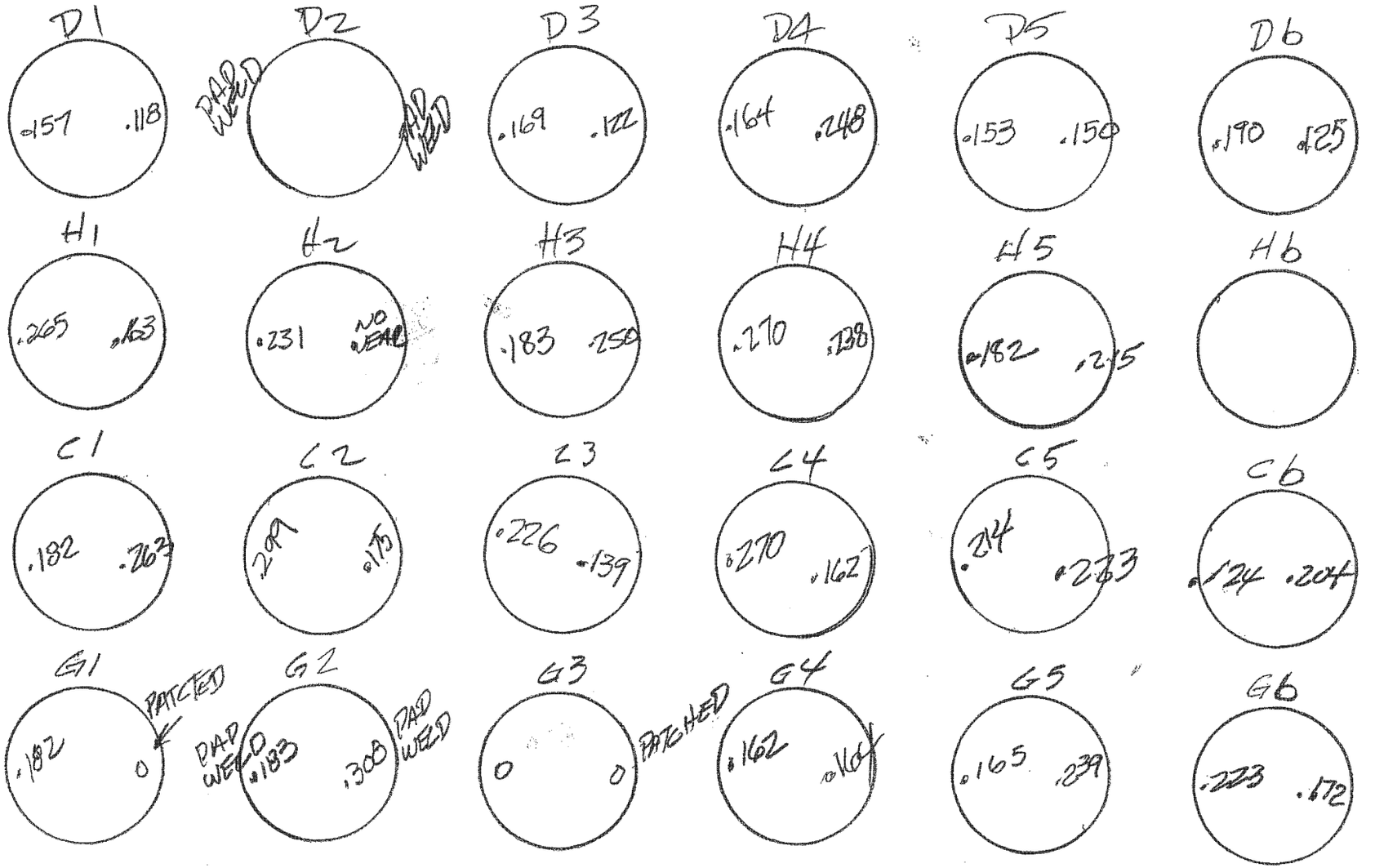
Front wall looking North Tips replaced Erosion Readings

East

IP7021431

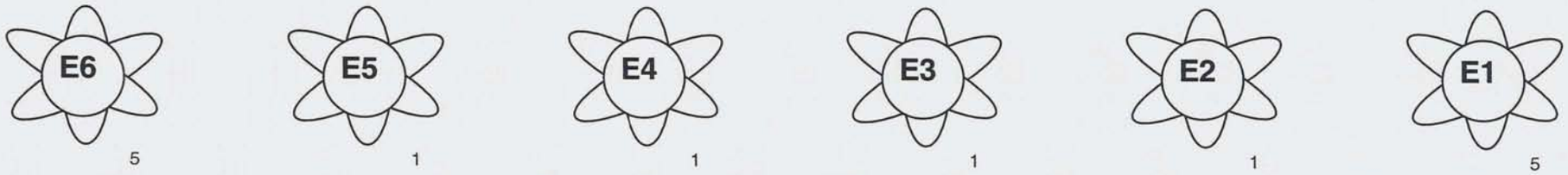

8th Floor
0.157
D1
0.118
pad weld
D2
pad weld
33" SS tip laydown
0.169
D3
0.122
33" PI 2000 old burner
0.164
D4
0.248
0.153
D5
0.150
33" PI 2000 old burner
0.190
D6
0.125
33" PI 2000 old burner
7th Floor
0.265
H1
0.163
0.231
H2
0.375
33" PI 2000 old burner
0.183
H3
0.250
33" PI 2000 old burner
0.270
H4
0.238
0.182
H5
0.215
42" SS from PI
H6
40" SS tip laydown
6th Floor
0.182
C1
0.263
0.299
C2
0.175
0.226
C3
0.139
0.270
C4
0.162
0.214
C5
0.223
0.124
C6
0.204
5th Floor
0.182
G1
0.00
0.183
pad weld
G2
0.308
pad weld
0.00
G3
0.00
pad weld
33" PI 2000 old burner
0.162
G4
0.164
33" SS tip laydown
0.165
G5
0.239
33" SS tip laydown
0.223
G6
0.172
East
Rear Wall Looking South Tips replaced Erosion Readings
West


GALV 1/16± STRAPPED ON W/ METAL HOSE CLAMPS
.150 E6 .153
.194 E5 .212
.198 E4 .278
.214 E3 .294
.277 E2 .188
E1 .175
.204 A6 .255
.187 A5 .281
A4 .167
WORN
A3
.188 A2 .198
A1
GALV 1/16± STRAPPED ETC
.283 F6 .283
PL WELDED
F5 .365
HAS BEEN WELDED UP
BEEN WELDED
F4 SEE PIC
IS COMPLETELY F3 DESTROYED
.213 F2 .214
.253 F1 .271
.107 B6
.122 B5 .128
B4 .227
PL WELDED
.228 B3
.175 B2 .124
.120 B1 .170

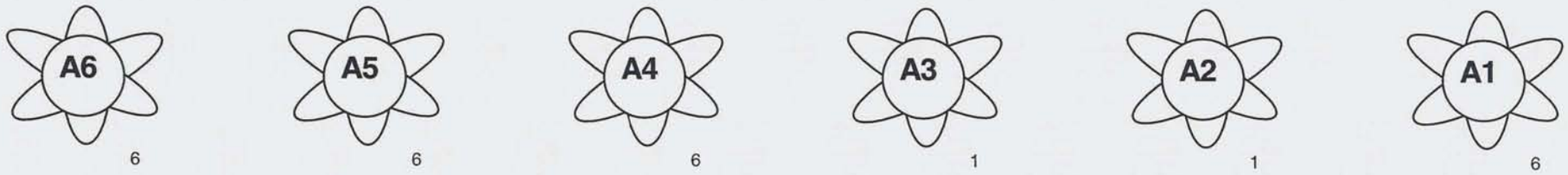

D1
.157
.118
D2
BAD WELD
BAD WELD
D3
.169
.122
D4
.164
.248
D5
.153
.150
D6
.190
.125
H1
.265
.163
H2
.231
NO SEAL
H3
.183
.250
H4
.270
.238
H5
.182
.215
H6
C1
.182
.263
C2
.299
.175
C3
.226
.139
C4
.270
.162
C5
.214
.283
C6
.124
.204
G1
.182
0
PATCHED
G2
BAD WELD
.183
.300
BAD WELD
G3
0
0
PATCHED
G4
.162
.164
G5
.165
.239
G6
.223
.172

1 → 10
Good → bad

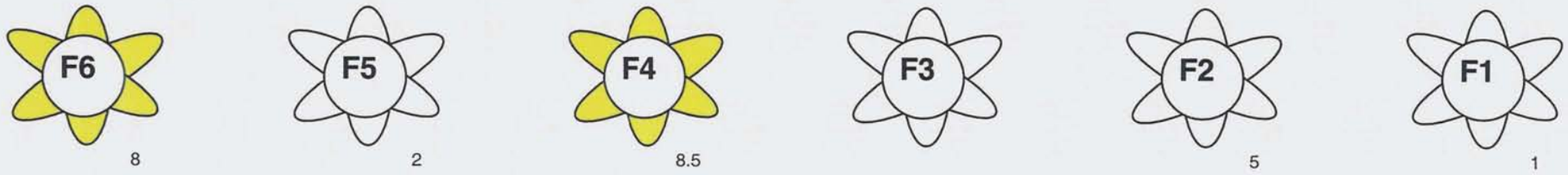
8th Floor



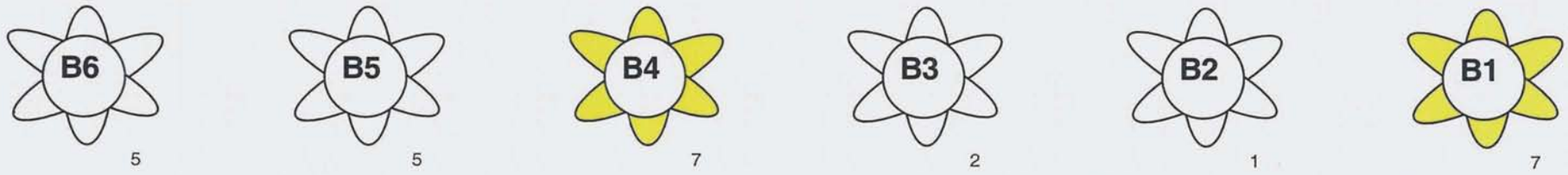
7th Floor



6th Floor



5th Floor



West

Front wall looking North (Tips replaced)

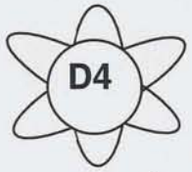
East

IP7021435

8th Floor

8

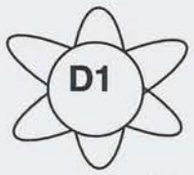
9



3

9

8



1

7th Floor

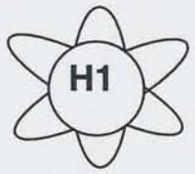
8.5

8.5

3

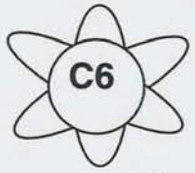
8.5

8



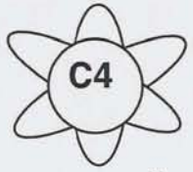
3

6th Floor

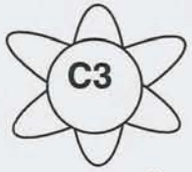


4

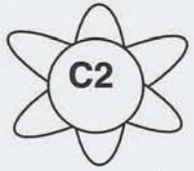
4



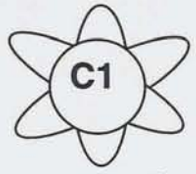
2



1



1



1

5th Floor

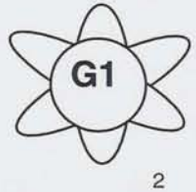
5

8

8

8

5



2

West

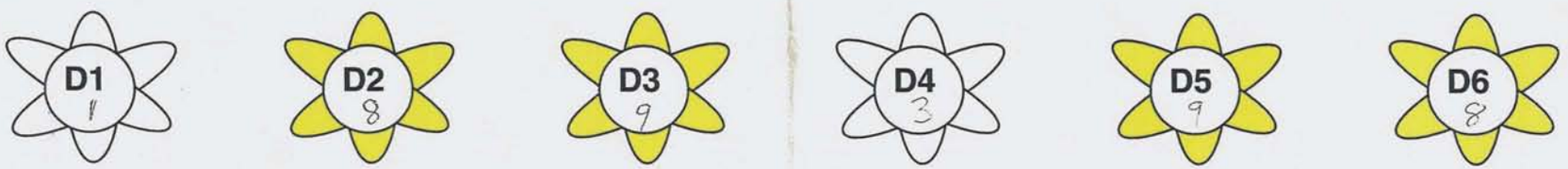
Rear Wall Looking North (Tips replaced)

East

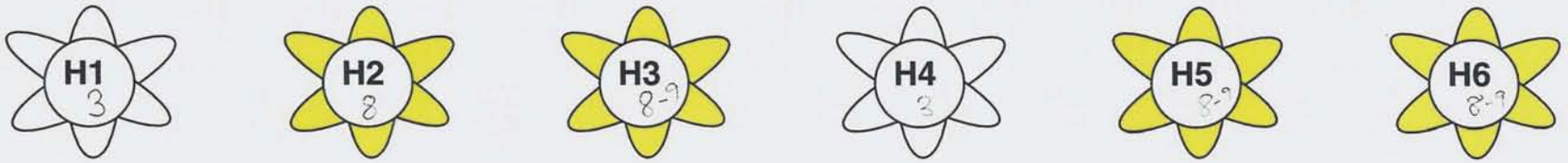
west east

Burner #	6	5	4	3	2	1	row average
E	5	1	1	1	1	5	**2.3**
A	6	6	6	1	1	6	**4.3**
F	8	2	8.5		5	1	**4.9**
B	5	5	7	2	1	7	**4.5**
front burner ave	6.0	3.5	5.6	1.3	2.0	4.8	**3.9**
D	8	9	3	9	8	1	**6.3**
H	8.5	8.5	3	8.5	8	3	**6.6**
C	4	4	2	1	1	1	**2.2**
G	5	8	8	8	5	2	**6.0**
rear burner ave	6.4	7.4	4.0	6.6	5.5	1.8	**5.3**
column average	**6.2**	**5.4**	**4.8**	**4.0**	**3.8**	**3.3**	**4.6**

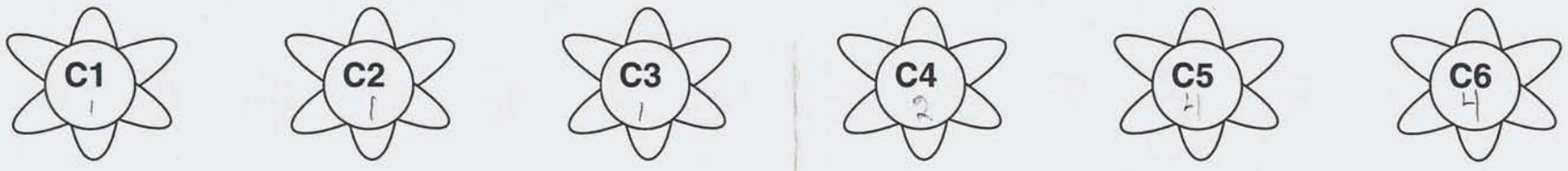
8th Floor



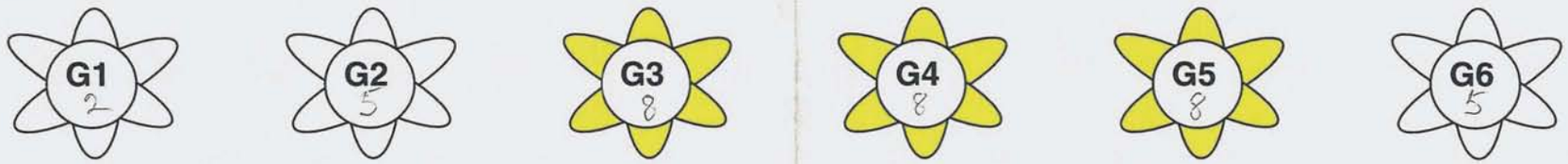
7th Floor



6th Floor



5th Floor



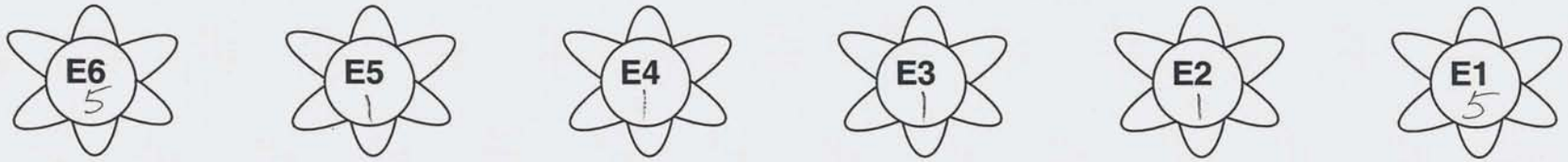
East Rear Wall Looking South (Tips to have air sleeve moved back) Tip to be replaced West

IP7021438

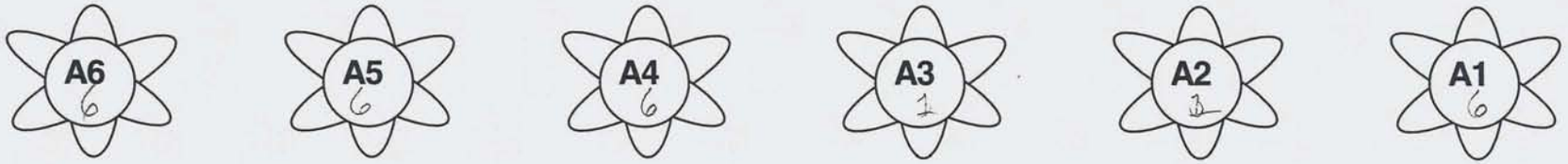
1 -> 11

Good -> bad

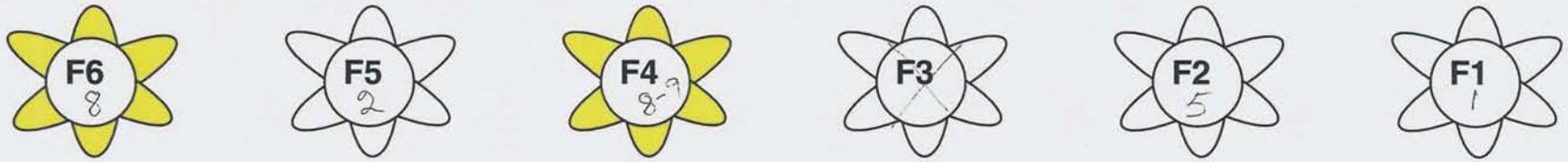
8th Floor



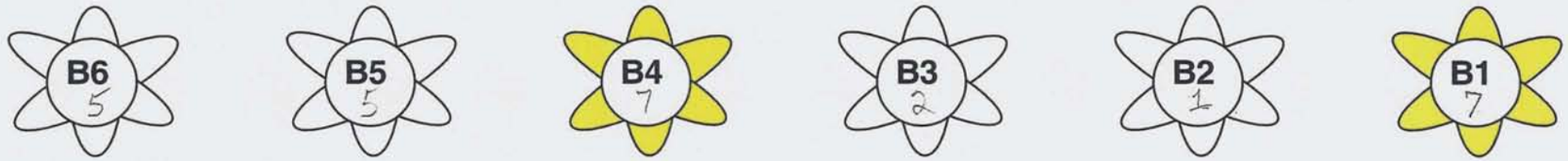
7th Floor



6th Floor



5th Floor



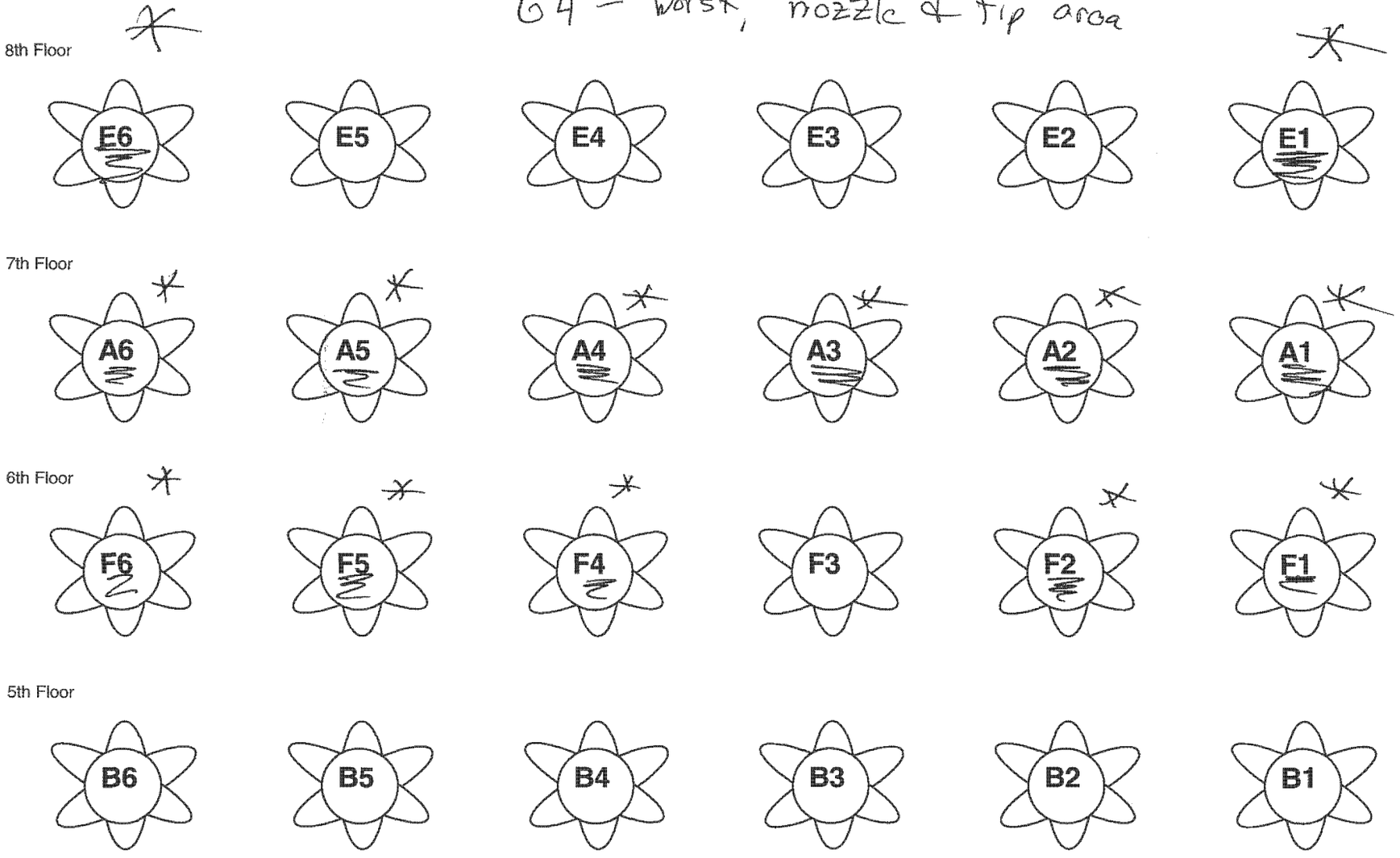
West

Front wall looking North (Tips to have air sleeve moved back.) Tip to be replaced

East

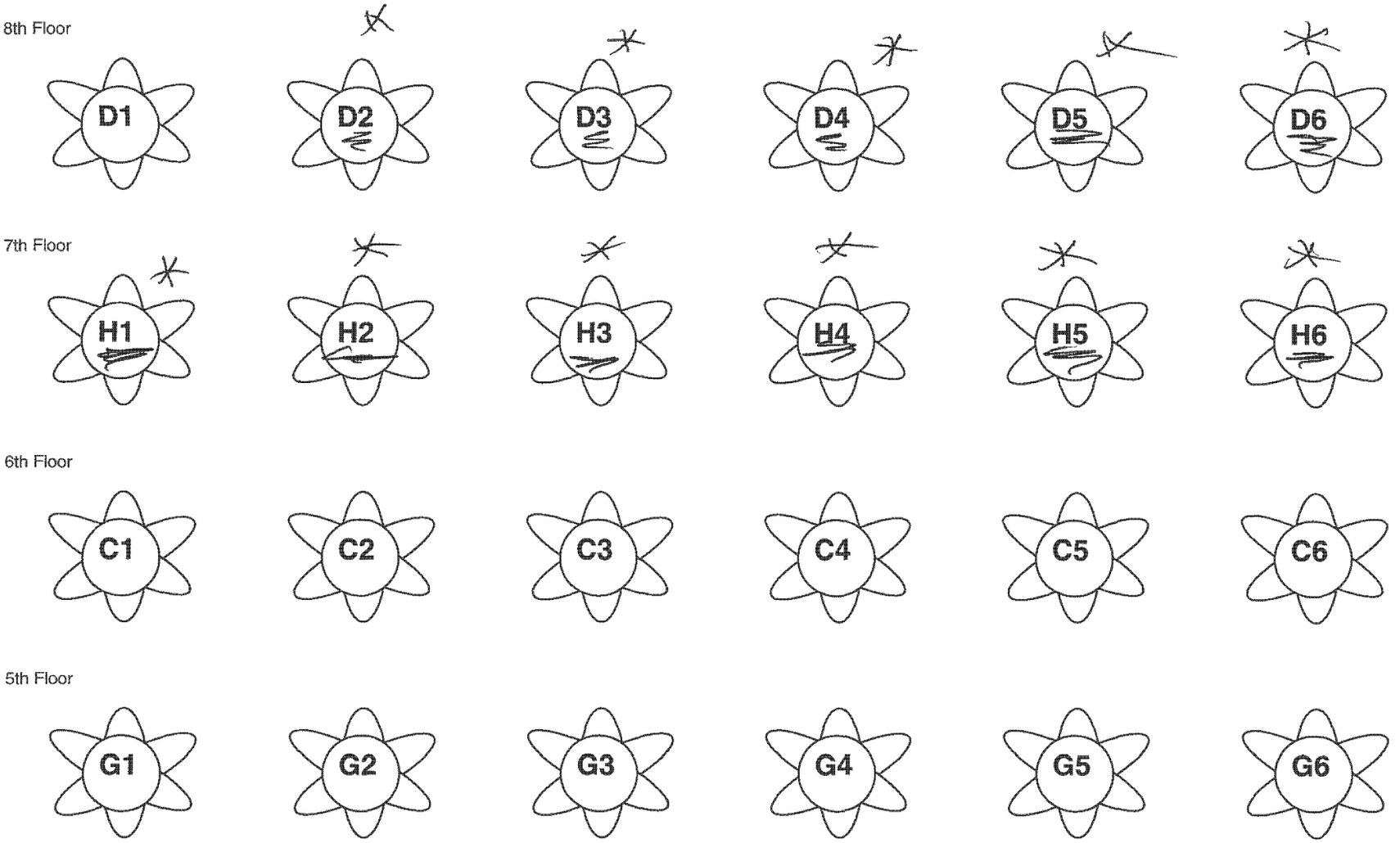
IP7021439

G3 - bad, nozzle-tip area
G4 - Worst, nozzle & tip area

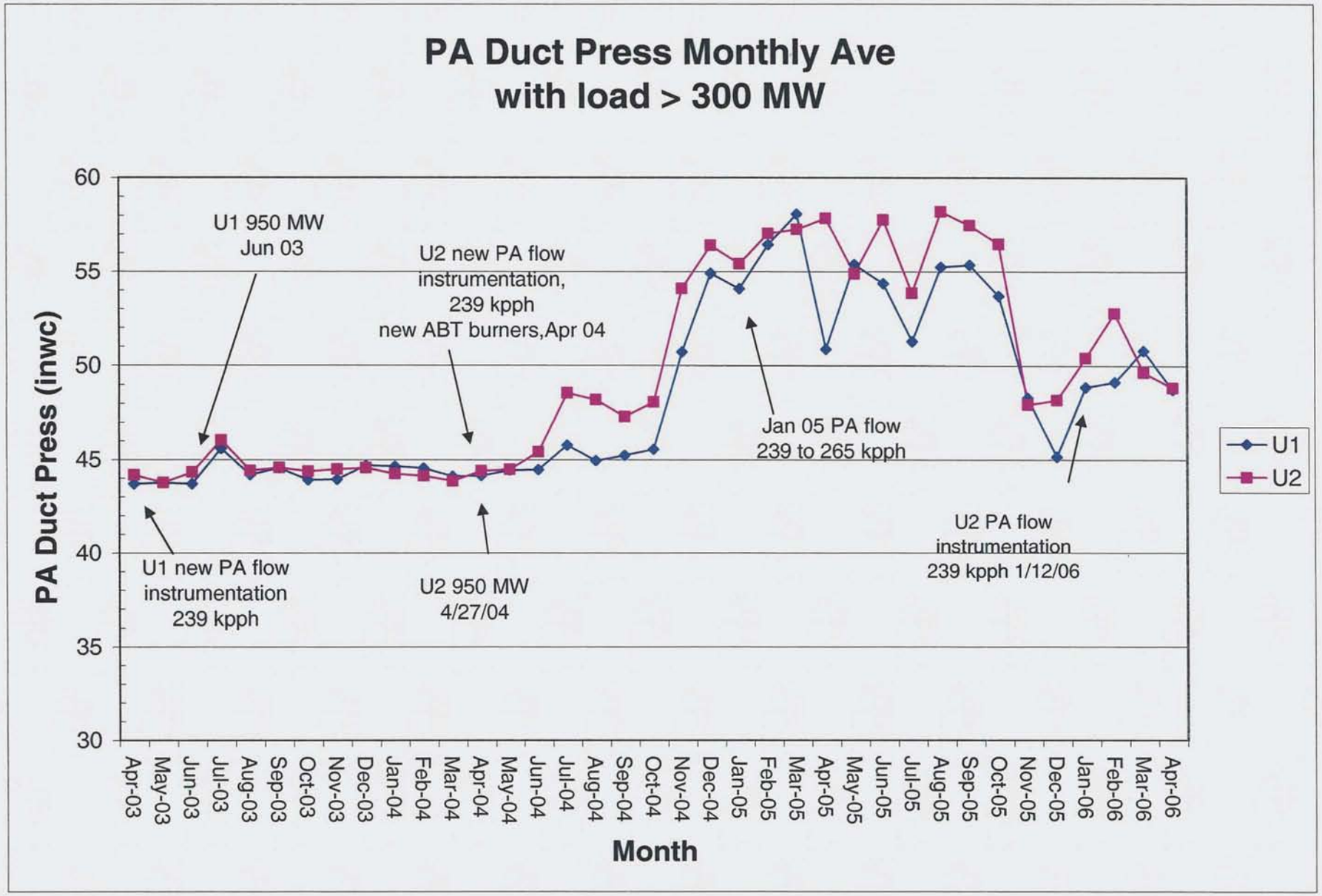


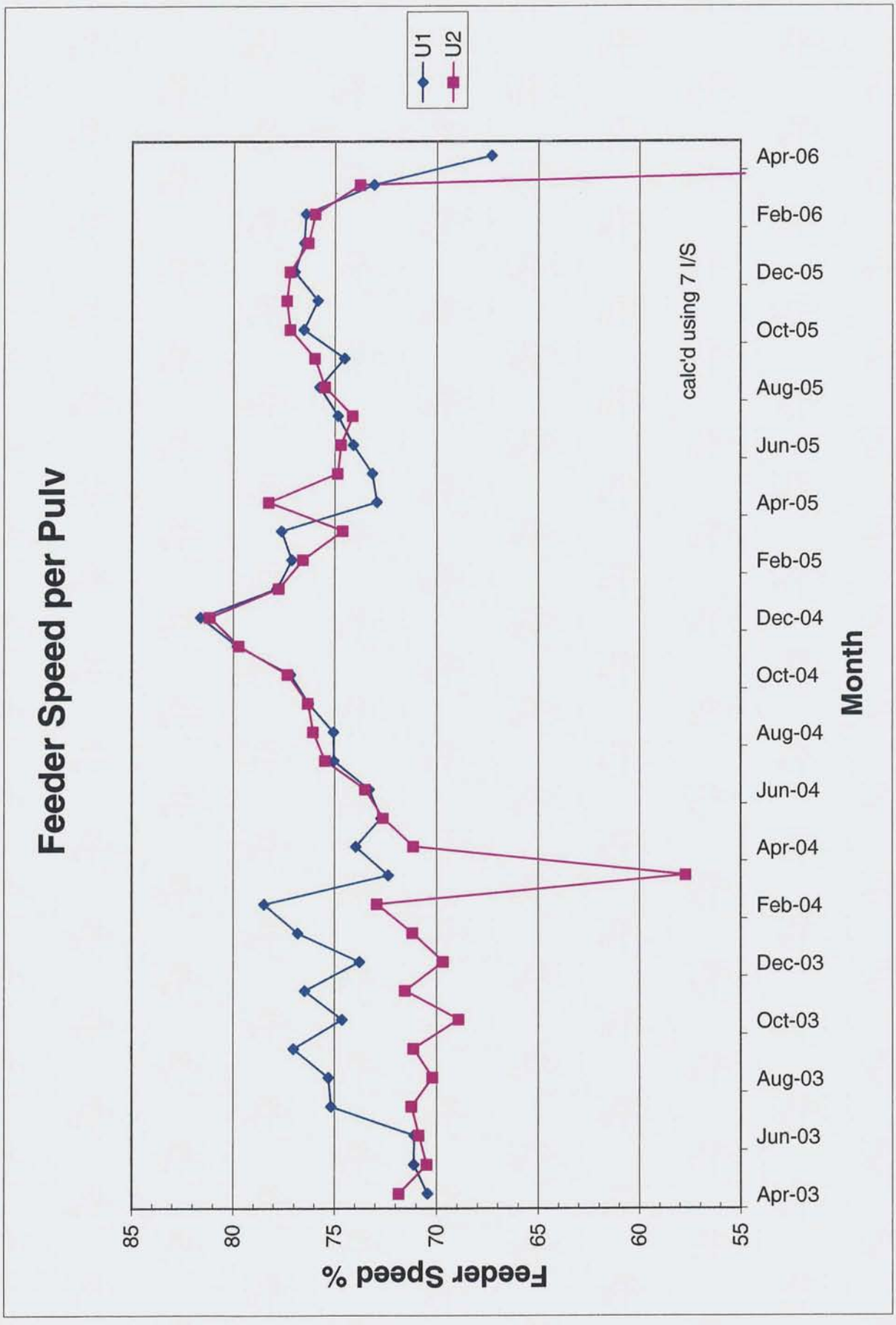
Front wall looking North

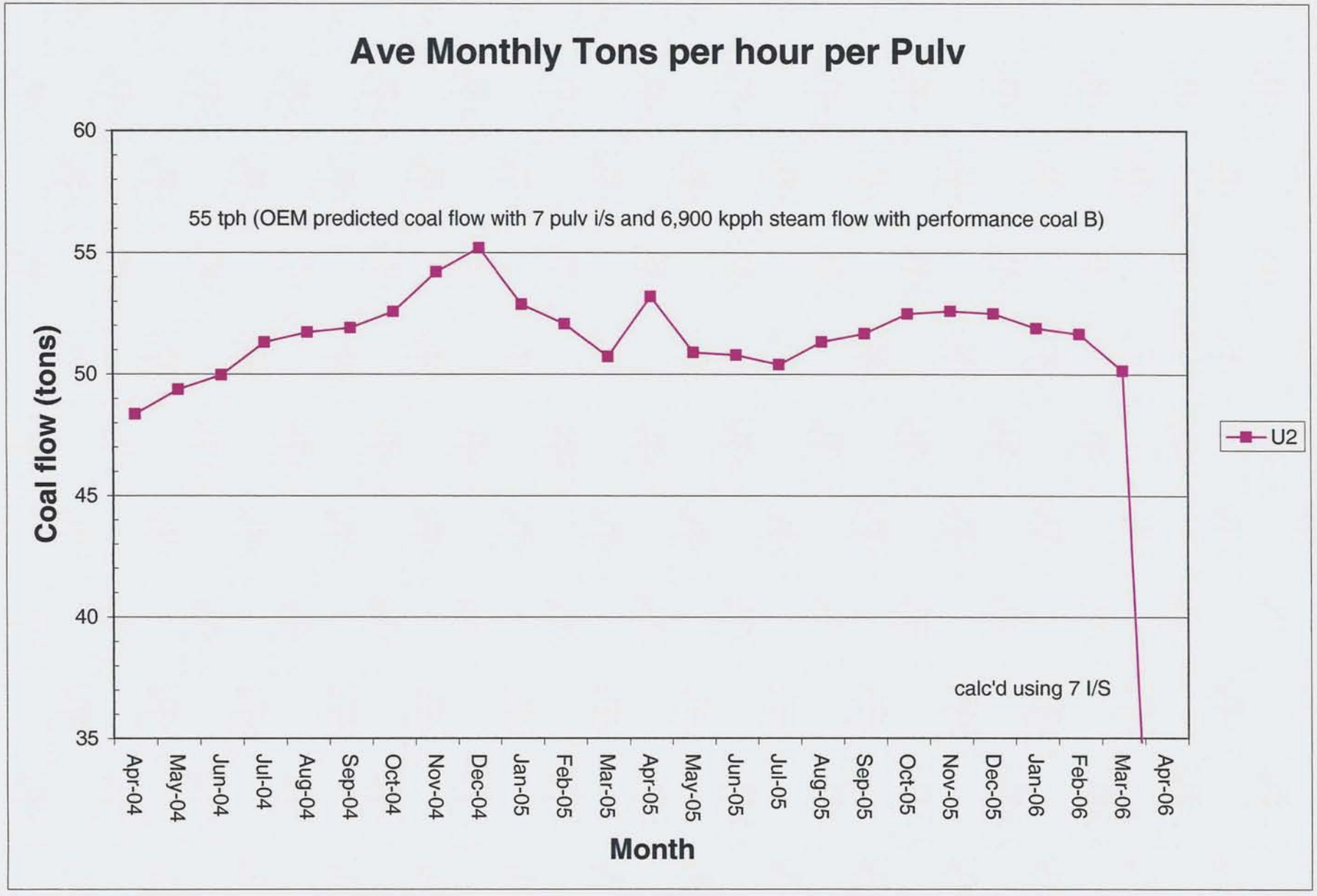
IP7021440



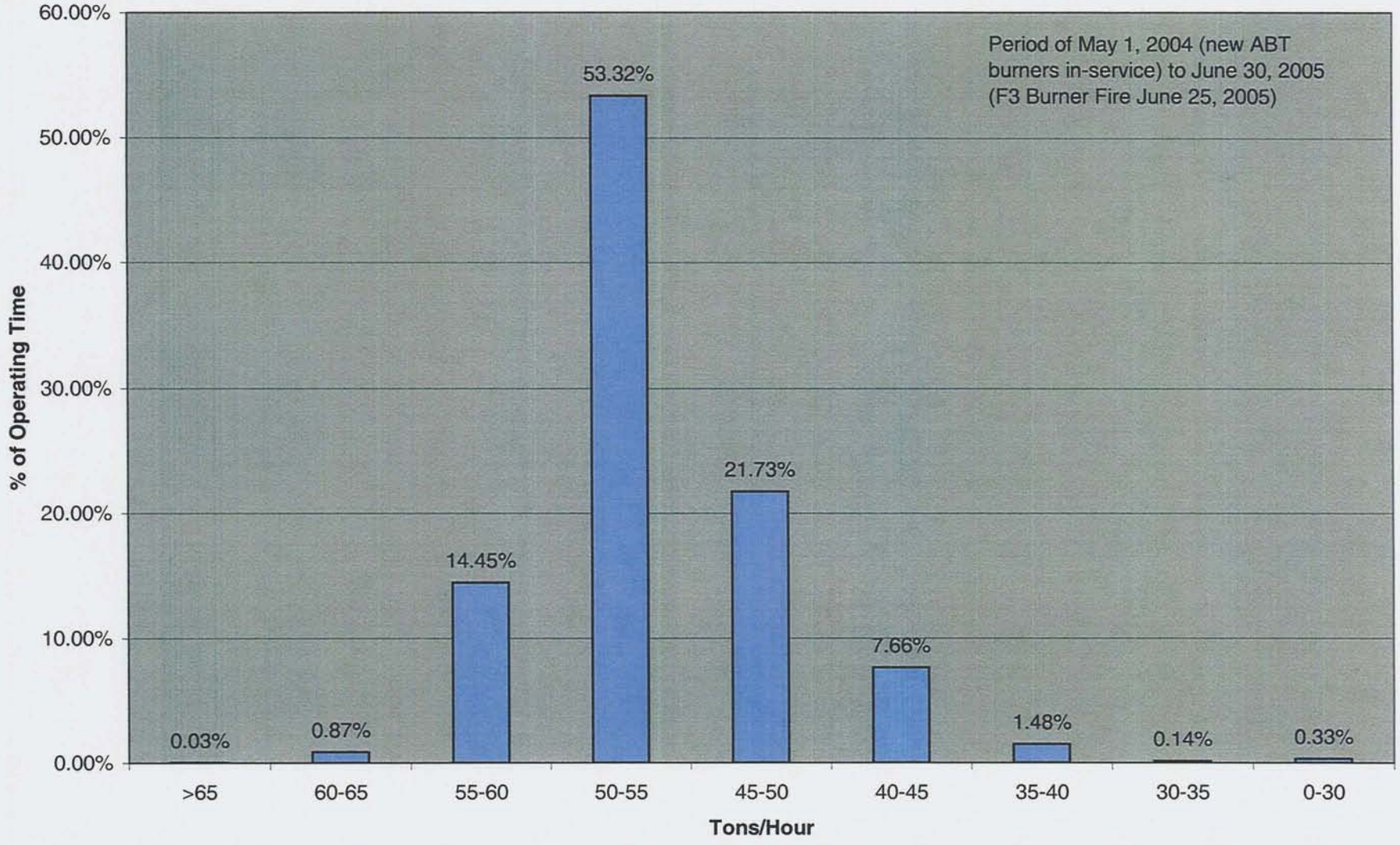
Rear Wall Looking South

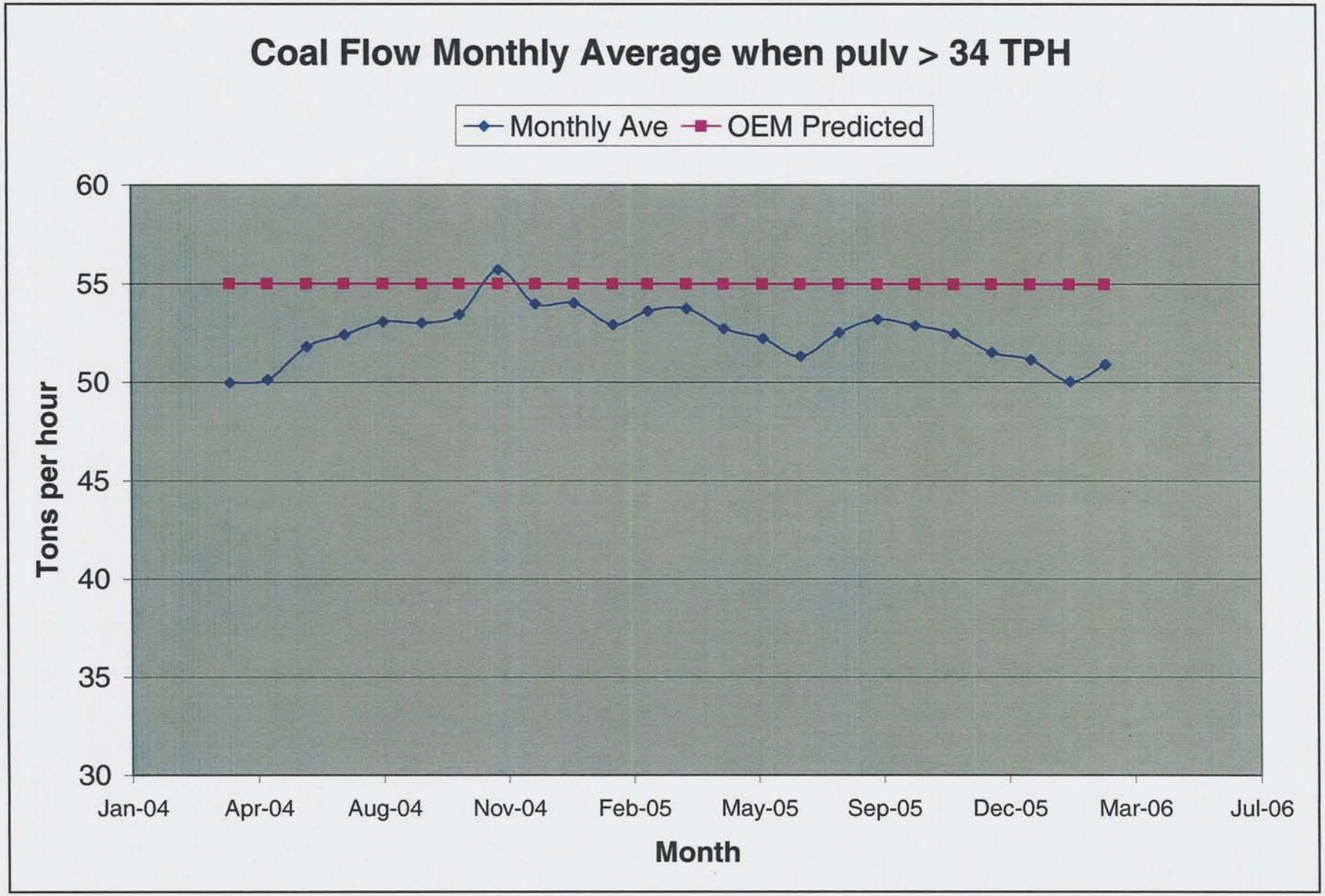

PA Duct Press Monthly Ave
with load > 300 MW
PA Duct Press (inwc)
60
55
50
45
40
35
30
U1 950 MW
Jun 03
U2 new PA flow
instrumentation,
239 kpph
new ABT burners,Apr 04
Jan 05 PA flow
239 to 265 kpph
U2 PA flow
instrumentation
239 kpph 1/12/06
U1 new PA flow
instrumentation
239 kpph
U2 950 MW
4/27/04
U1
U2
Apr-03
May-03
Jun-03
Jul-03
Aug-03
Sep-03
Oct-03
Nov-03
Dec-03
Jan-04
Feb-04
Mar-04
Apr-04
May-04
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
Month


Feeder Speed per Pulv
U1
U2
calc'd using 7 l/S
Feeder Speed %
85
80
75
70
65
60
55
Month
Apr-06
Feb-06
Dec-05
Oct-05
Aug-05
Jun-05
Apr-05
Feb-05
Dec-04
Oct-04
Aug-04
Jun-04
Apr-04
Feb-04
Dec-03
Oct-03
Aug-03
Jun-03
Apr-03


Ave Monthly Tons per hour per Pulv
55 tph (OEM predicted coal flow with 7 pulv i/s and 6,900 kpph steam flow with performance coal B)
calc'd using 7 I/S
Coal flow (tons)
60
55
50
45
40
35
Apr-04
May-04
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
Month
U2

Unit 2 Pulverizer 1F Loading



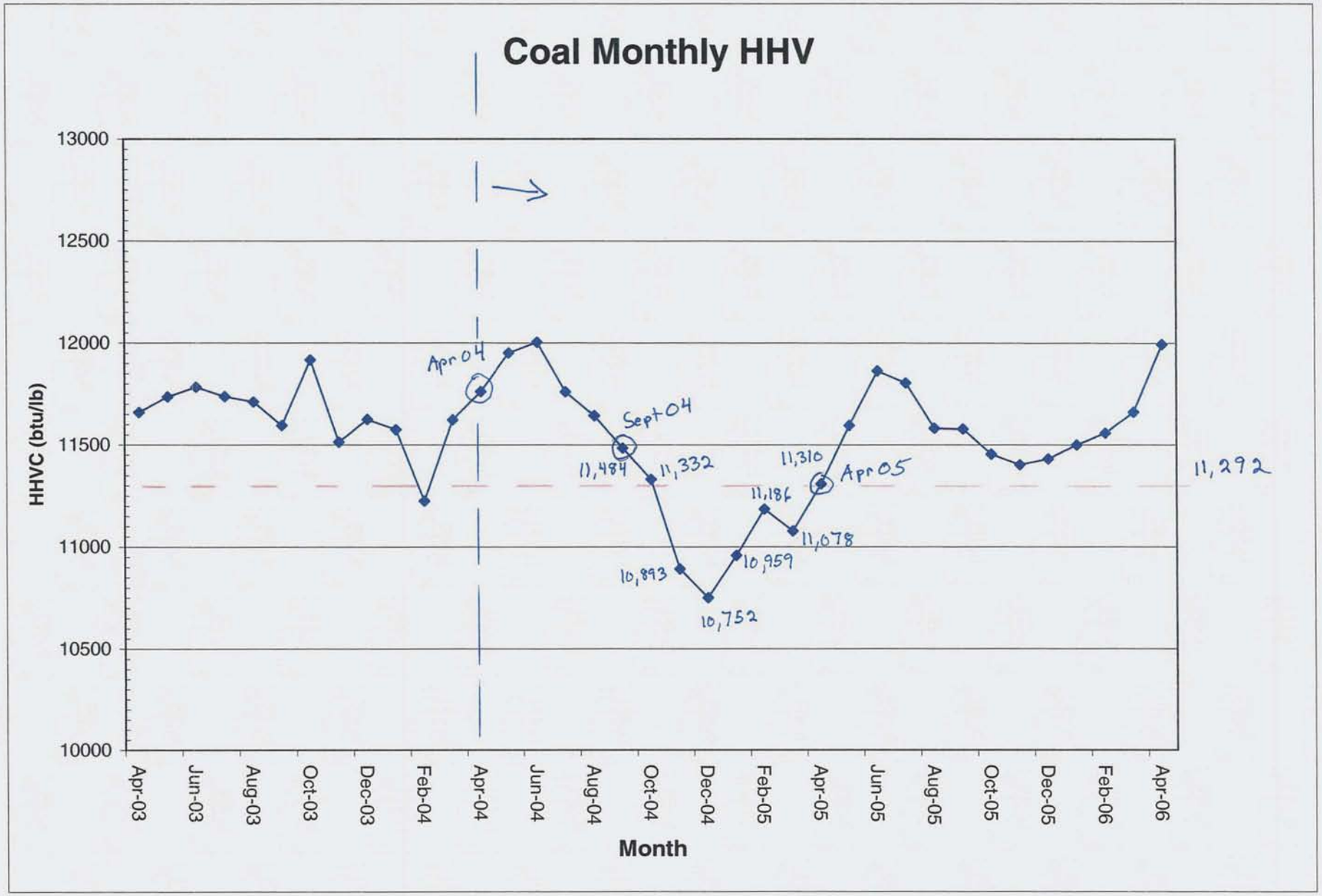

Coal Flow Monthly Average when pulv > 34 TPH
Monthly Ave
OEM Predicted
60
55
50
45
40
35
30
Tons per hour
Jan-04
Apr-04
Aug-04
Nov-04
Feb-05
May-05
Sep-05
Dec-05
Mar-06
Jul-06
Month

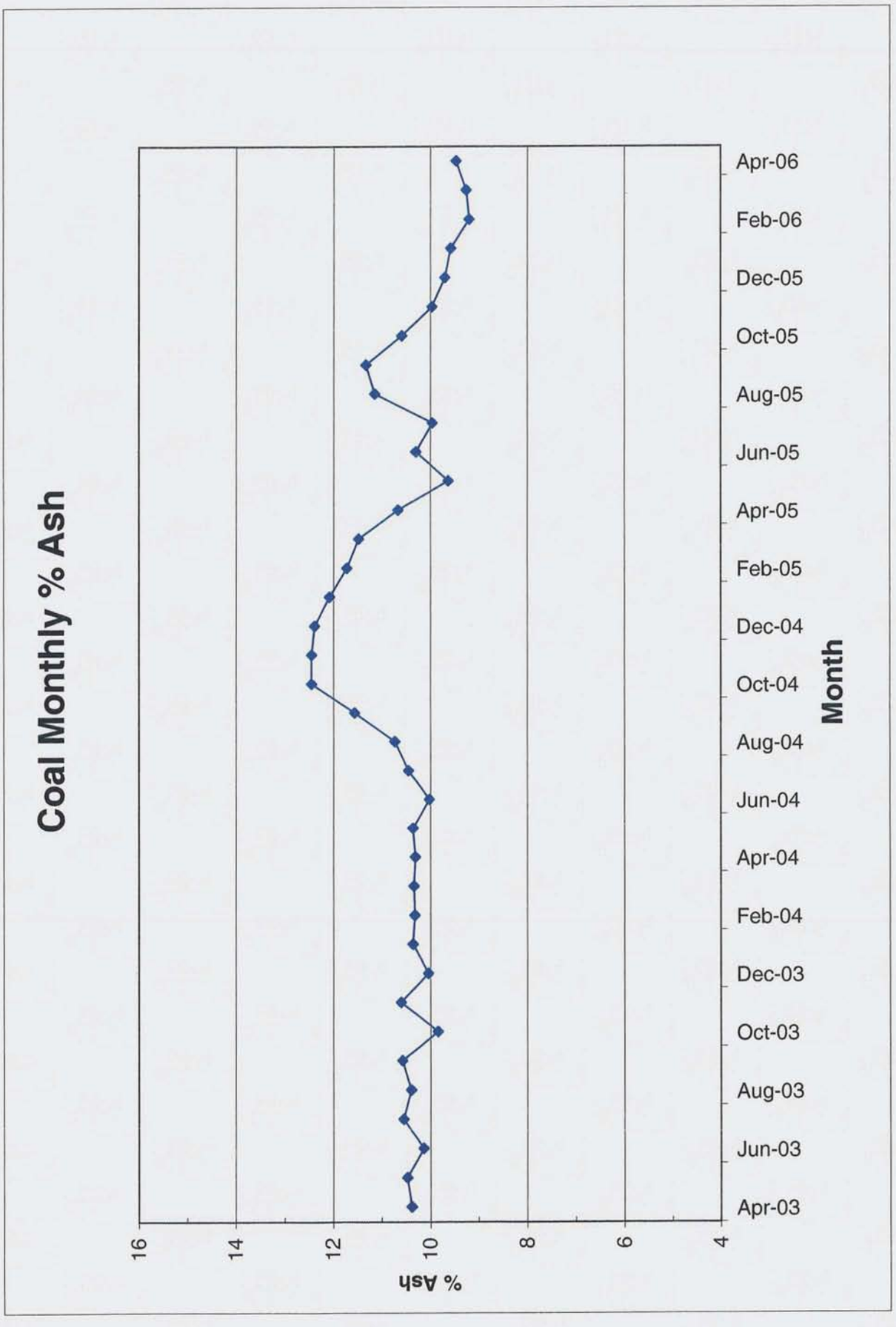
coal flow average when > 34 tph

	A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv	average
Apr-04	49.93	49.98	51.40	49.53	49.83	48.25	50.92	50.06	49.99
May-04	49.75	50.57	51.36	49.69	48.80	48.08	53.21	49.68	50.14
Jun-04	51.77	52.66	53.07	52.83	49.80	44.89	57.09	52.26	51.80
Jul-04	53.60	54.00	51.07	54.30	51.11	51.19	51.19	52.79	52.41
Aug-04	52.63	54.41	51.51	53.59	53.70	52.07	54.01	52.57	53.06
Sep-04	53.05	48.61	54.98	54.29	54.44	52.66	52.94	53.10	53.01
Oct-04	52.82	54.26	55.83	54.10	54.07	50.72	53.80	51.80	53.43
Nov-04		54.25	59.22	56.72	53.93	53.27	56.16	56.39	55.71
Dec-04	52.71	53.82	57.67	55.12	52.13	50.29	55.10	54.88	53.96
Jan-05	54.10	54.52	57.02	54.48	52.96	52.76	52.66	53.68	54.02
Feb-05	53.22	52.91	54.29	53.62	51.82	52.36	52.58	52.43	52.90
Mar-05	54.00	53.46	57.96	51.62	51.41	52.23	54.55	53.60	53.60
Apr-05	54.53	54.53		54.50	50.25	53.24	54.92	54.16	53.73
May-05	52.97	52.65	55.63	52.75	49.84	52.23	53.11	52.52	52.71
Jun-05	53.02	51.47	55.12	52.67	48.22	52.67		52.37	52.22
Jul-05	52.14	50.84	53.87	51.71	49.91	49.35		51.35	51.31
Aug-05	54.17	53.30	54.07	53.46	48.83	50.42		53.41	52.52
Sep-05	54.74	53.66	54.46	54.48	50.05	50.84		54.09	53.19
Oct-05	53.60	53.68	54.18	53.70	51.34	49.40	53.53	53.58	52.88
Nov-05	53.98	54.01	53.93		52.68	45.53	53.86	53.27	52.47
Dec-05	52.97	52.98	52.98	51.70	50.90	45.12	53.14	52.32	51.51
Jan-06	51.38	52.41	52.45	52.10	49.66	46.58	52.65	51.88	51.14
Feb-06	52.80	53.12	53.06	52.20	49.32	45.92	53.25	40.83	50.06
Mar-06	52.33	51.97	51.97	51.70	50.63	45.39	52.06	51.30	50.92

coal flow maximum value

A Pulv	B Pulv	C Pulv	D Pulv	E Pulv	F Pulv	G Pulv	H Pulv
67.32	59.63	65.00	53.18	56.28	63.29	67.79	67.46
64.94	60.60	65.26	60.20	62.95	61.52	66.57	65.07
64.38	65.12	62.48	64.95	67.91	61.49	67.60	64.54
67.41	67.38	67.56	67.93	65.97	67.69	67.85	67.53
64.21	63.69	63.61	65.60	65.08	64.86	65.83	59.89
66.36	53.03	67.37	66.90	65.09	64.67	66.99	62.56
63.02	65.97	66.57	65.88	64.11	64.01	65.66	63.60
-	66.45	68.00	66.15	65.03	64.40	63.94	65.87
65.02	67.65	68.00	67.88	64.10	63.51	67.86	67.61
67.04	67.16	67.09	67.05	62.19	67.03	63.76	61.70
64.03	67.78	67.10	61.20	64.79	67.78	67.83	65.95
65.55	63.37	68.00	61.43	63.61	62.23	63.84	62.99
58.19	60.75	-	60.37	56.46	57.65	60.75	59.81
59.69	61.16	63.31	60.77	68.00	59.94	61.22	59.31
63.33	63.56	66.27	63.22	60.00	62.92	-	62.65
64.08	64.34	67.16	61.67	63.44	61.21	-	63.32
66.05	61.70	66.19	63.30	57.51	54.53	-	65.31
67.20	65.04	66.30	66.97	63.94	59.80	-	66.35
63.50	65.90	65.84	65.49	62.57	54.51	66.02	65.12
59.75	60.51	60.42	-	58.86	45.90	60.57	59.55
60.04	60.08	59.98	57.01	60.30	46.50	60.14	59.26
63.09	63.11	67.98	62.66	60.31	54.42	63.22	62.29
62.61	62.70	62.59	62.21	59.30	57.17	62.84	43.81
61.59	61.66	61.60	61.23	58.91	55.82	61.30	60.82


Coal Monthly HHV
HHVC (btu/lb)
13000
12500
12000
11500
11000
10500
10000
Apr-03
Jun-03
Aug-03
Oct-03
Dec-03
Feb-04
Apr-04
Jun-04
Aug-04
Oct-04
Dec-04
Feb-05
Apr-05
Jun-05
Aug-05
Oct-05
Dec-05
Feb-06
Apr-06
Month
Apr 04
Sept 04
11,484
11,332
10,893
10,752
10,959
11,186
11,310
11,078
Apr 05
11,292


Coal Monthly % Ash
% Ash
16
14
12
10
8
6
4
Month
Apr-06
Feb-06
Dec-05
Oct-05
Aug-05
Jun-05
Apr-05
Feb-05
Dec-04
Oct-04
Aug-04
Jun-04
Apr-04
Feb-04
Dec-03
Oct-03
Aug-03
Jun-03
Apr-03

	HHVC	difference from 11,500	difference from 11,292
Apr-04	11,762	262	470
May-04	11,952	452	660
Jun-04	12,004	504	712
Jul-04	11,760	260	468
Aug-04	11,643	143	351
Sep-04	11,484	(16)	192
Oct-04	11,332	(168)	40
Nov-04	10,893	(607)	(399)
Dec-04	10,752	(748)	(540)
Jan-05	10,959	(541)	(333)
Feb-05	11,186	(314)	(106)
Mar-05	11,078	(422)	(214)
Apr-05	11,310	(190)	18
May-05	11,596	96	304
Jun-05	11,864	364	572
Jul-05	11,805	305	513
Aug-05	11,582	82	290
Sep-05	11,578	78	286
Oct-05	11,456	(44)	164
Nov-05	11,405	(95)	113
Dec-05	11,433	(67)	141
Jan-06	11,501	1	209
Feb-06	11,559	59	267
Mar-06	11,661	161	369
		sum of difference	sum of difference
average	11,481	(445)	4,547

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		sum of difference	sum of difference
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